HOËR KRAG

ضغط عالي

ONAAK BIDUOTH

ВИСОКО НАПРЕЖЕНИЕ

高压

VISOKI NAPON

VYSOKÉ NAPĚTÍ

HOOGSPANNING

MATAAS NA BOLTAHE

HAUTE TENSION

HOCHSPANNUNG

γψηλή τάση

מתח גבוה

MAGAS ÁRAM

ARDVOLTAS

ALTA TENSIONE

高圧

고전압

AUKŠTA ĮTAMPA

ВИСОКИ НАПОН

STERK STRØM

ÎNALTĂ TENSIUNE

ВЫСОКОЕ НАПРЯЖЕНИЕ

HIGH VOLTAGE

ВИСОКИ НАПОН

VISOKA NAPETOST

ALTO VOLTAJE

HÖGSPÄNNING

YÜKSEK VOLTAJ

ĐIỆN CAO THẾ

ВІСОКА НАПРУГА

VYSOKÉ NAPÄTIE

Spellman

SETTING THE STANDARD IN
HIGH VOLTAGE POWER CONVERSION

2008 SELECTION GUIDE

Spellman®
High Voltage Electronics Corporation

www.spellmanhv.com

SPELLMAN HIGH VOLTAGE

2008 SELECTION GUIDE

YOUR PARTNER IN POWER

Spellman High Voltage Electronics

Setting the Standard

When manufacturers around the world require high-precision, well-regulated power, one name most often comes to mind: Spellman High Voltage. For the past 60 years, Spellman has helped innovative system developers succeed by custom designing and manufacturing the best high voltage DC power supplies for their unique requirements.

Spellman's global direct sales and technical support professionals, and our specialized sales representatives, focus on adding value over the long term. They amplify our customers' voices within Spellman, ensuring that the right people are aware, the right resources are allocated and the right response is generated.

THE POWER IN YOUR SYSTEM

You can rely on the world's largest and most experienced high voltage engineering staff to design the best solutions for your system requirements. World-class project teams, experienced in specific applications and technologies, are dedicated not only to new designs but also to sustaining engineering throughout the life of each product.

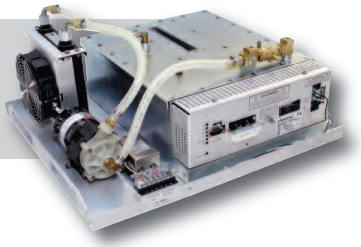
BROAD PRODUCT RANGE

We offer power converters with well regulated outputs from < 250V to 500kV, and from <1W to >120kW. High stability, extremely low ripple and low partial discharge features are available.

Our broad portfolio of field-validated designs may be used as is, or as platforms for custom designs, reducing cost and time to market.

INNOVATIVE DESIGNS

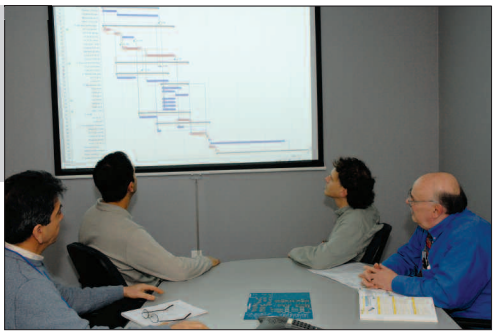
Our innovative circuit designs, proprietary processes and custom components are used to improve reliability, increase power density, reduce footprint and lower cost.

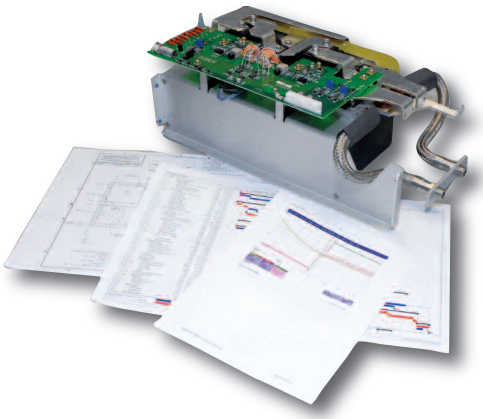


- Spellman holds important power conversion and control system patents.
- Extensive digital capabilities offer industry-leading control and communication protocols.
- Advanced insulation (RTV, epoxy, oil and air) and thermal management techniques allow for compact physical configurations while ensuring reliable performance.

SYSTEMATIC PROJECT MANAGEMENT

Consistent communication and disciplined adherence to project plans ensures that milestones are met and customers have the information they need to best manage their system development.





- Internal research and development programs achieve groundbreaking technical advances – without slowing down current development projects.
- State-of-the-art simulation and design software, engineering laboratories, and vertically integrated manufacturing resources, facilitate concurrent engineering and efficient and rapid completion of design projects.
- Extensive in-house testing, including HALT and HASS, verifies that our products meet or exceed customers' requirements for field reliability. Self-certification for CE and participation in UL's Client Test Data Program, provides a rapid and cost-effective path to regulatory compliance.
- Manufacturing and quality engineers, as well as supply chain representatives, participate in the Design for Excellence process (DFX). A disciplined manufacturing release process, beginning during the prototype and pre-production phases, creates efficient and clear work instructions facilitating transfer to low cost manufacturing centers as production ramps.
- Product specialists monitor in process and field performance to ensure continual improvement during the life of the product.

A POWERFUL LINK IN YOUR SUPPLY CHAIN

GLOBAL REACH

With the broadest range of products in our market and over 1100 employees located in North America, Europe and Asia, choosing Spellman makes it possible for many customers to reduce their vendor base. Our six integrated manufacturing facilities permit us to locate production to minimize cost and support individual customer needs.

- Low-cost manufacturing centers in Mexico and China provide high quality products at competitive prices.
- Spellman's purchasing power and global supply chain alliances with superior vendors enables us to negotiate competitive pricing stocking and delivery programs.
- C-TPAT certification reduces international shipment transit times, as well as the risk of lengthy delays due to sudden increases in border security.

AGILITY

To service our high mix, build to order market, we have designed manufacturing processes that can respond quickly to changing customer demands.

- Lean manufacturing techniques such as value stream mapping, focused factories, mixed and single model cells, and visual control systems are some of the tools used to reduce cost and lead time.
- In-house expertise in sub-assembly manufacturing processes - including sheet metal fabrication, machining, welding and finishing, high voltage coil winding, printed circuit board assembly (surface mount and thru-hole) and encapsulation - increase control of quality, reduce time-to-market and permit quick reaction to design or market changes.

GENERATING CONTINUOUS IMPROVEMENT

Spellman's quality system focuses on understanding and providing what our customers value. Lean and Six Sigma initiatives empower individuals and teams to conduct systematic root cause analyses, and implement effective corrective prevention measures.

In 1994, Spellman demonstrated its long-standing commitment to rigorous standards of quality by becoming the first high voltage company to achieve ISO 9001 certification.

GLOBAL SERVICE CENTERS

Service centers in New York, Mexico, United Kingdom, China and Japan, provide local technical expertise and rapid response capability. Product specialists are always ready to visit our customers' sites.

ENVIRONMENTAL STEWARDSHIP

Spellman is committed to environmentally sustainable operations and compliance with international standards such as RoHS, WEEE and ISO14001.

BUSINESS CONTINUITY

Spellman's steady growth over 60 years has been built upon prudent financial and business risk management.

Diversified clients and markets, manufacturing facilities in multiple locations with overlapping capabilities, a robust supply chain and corporate focus on business continuity planning, provide confidence that Spellman will remain a reliable, strategic business partner.

APPLICATIONS

MEDICAL

- Bone Densitometry
- CT Imaging
- Electroporation
- Gamma Cameras
- Immunocytology
- Lithotripsy
- Mammography
- PET Imaging
- Radiotherapy
- X-Ray Image Intensifiers

INDUSTRIAL & COMMERCIAL

- Cable Testing
- Capacitor Charging
- EB/IB Deposition
- Electron Beam Lithography
- Electrostatic Spraying
- Electrostatic Chucks
- Electrostatic Lenses
- Focused Electron Beam
- Focused Ion Beam
- Ion Beam Implantation
- Lasers
- Microwave Heating
- Printing
- Telecommunications Power Feed
- UV Curing
- Vacuum Deposition
- Vacuum Ion Pumps
- Wireline Logging

X-RAY ANALYSIS

- Baggage Screening
- Explosive Detection
- Food Inspection
- NDT
- Product Inspection
- Thickness Gauging
- X-Ray Diffraction
- X-Ray Fluorescence

BIOTECHNOLOGY

Photo provided courtesy of Applied Biosystems.

- Capillary Electrophoresis
- GC Mass Spectrometry
- Gel Electrophoresis
- ICP Mass Spectrometry
- LC Mass Spectrometry
- Photomultipliers
- Scanning Electron Microscopy
- TOF Mass Spectrometry
- UV Sterilization

All of our product families have configurable options and can be customized to suit your requirements.

- Modular supplies offer a single output up to 600W 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. Monoblock® X-Ray Sources integrate an X-Ray tube with the generator and meet stringent radiation leakage requirements.
- Application specific products are designed to support the requirements of particular loads or systems.

PRODUCT INDEX

MODULES

RACK MOUNTED

X-RAY SOURCES

X-RAY GENERATORS

APPLICATION SPECIFIC

HOT SWITCHABLE

MULTIPLE OUTPUT PCB MOUNT

ACCESSORIES

- ***OUTPUTS UP TO 15KV AT 1.5W OR 2.5W***
- ***COMPACT SIZE***
- ***LOW COST***
- ***ARC AND SHORT-CIRCUIT PROTECTION***
- ***POSITIVE OR NEGATIVE OUTPUTS***
- ***OUTPUT VOLTAGE PROPORTIONAL TO INPUT VOLTAGE***
- ***REVERSIBLE POLARITY MODULES AVAILABLE***
- ***ARC FLASHOVER PROTECTION***
- ***PCB MOUNTING***
- ***OEM CUSTOMIZATION AVAILABLE***

Spellman's MM Series of high voltage power supplies are low cost, general purpose, dc to dc converters with output voltages up to 15kV.

They are designed for direct PCB mounting. High reliability is incorporated into these compact and lightweight modular blocks intended for customer designed products at power levels up to 2.5W. The modules are fully encapsulated in an ABS box and may be wave soldered.

The MM Series can be used with an external resistor feedback loop to provide regulated outputs. See the following pages for application diagrams illustrating a range of voltage regulated circuits using the MM high voltage power supplies.

TYPICAL APPLICATIONS

Photomultiplier Tubes
Solid State Detectors
Flow Sensors
Analytical Instruments
Spectral Source Lamps
Ink Jet Printers
Gas Chromatography

OPTIONS

1.5W & 2.5W Modules

I Input to Output Isolation
S Screened Box
C Continuous Short Circuit protection

1.5W Reversible Module

S Screened Box
C Continuous Short Circuit protection

Customer Special Versions

- Other input and output voltage modules can be supplied.
- Mechanical dimensions to meet customer requirements are always considered where standard modules are not suitable.
- Please call us to discuss your custom design requirements.

SPECIFICATIONS

Input Voltage:
9Vdc, 12Vdc, or 24Vdc. Other input voltages (6Vdc to 28Vdc) available upon special order.

Input Current:
Typically less than 1A at full output.

Output Voltage:
Maximum voltages between 300V and 15kV are available (see tables). Output voltage is proportional to the input voltage over the range 10% to 100%. Optionally, multiple outputs can also be supplied.

Output Power:
1.5W continuous; 3W peak
2.5W continuous; 5W peak

Output Ripple:
Less than 0.2% p-p

Load Regulation:
10% maximum.

Module Efficiency:
55% to 70%

Operating Frequency:
100kHz to 400kHz dependent on module type.

Dimensions:
Case Size A and E:
0.79″H x 1.57″W x 1.57″D (20mm x 40mm x 40mm).
Case Size B and F:
1.18″H x 1.97″W x 1.97″D (30mm x 50mm x 50mm).
Case Size C:
1.38″H x 1.97″W x 2.99″D (35mm x 50mm x 76mm).
Case Size D and G:
1.65″H x 2.99″W x 3.98″D (42mm x 76mm x 101mm).

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MM 1.5W SELECTION TABLE

Model Number	Output V Vdc Max	Full Load I mA Average	Ripple(max) Vp-p	Case Size
MM0.3*1.5W	300	5.0	0.6	A
MM0.5*1.5W	500	3.0	1.0	A
MM1*1.5W	1,000	1.5	2.0	A
MM1.5*1.5W	1,500	1.0	3.0	A
MM2*1.5W	2,000	0.75	4.0	A
MM3*1.5W	3,000	0.5	6.0	A
MM5*1.5W	5,000	0.3	10.0	B
MM10*1.5W	10,000	0.15	20.0	C

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

MM 2.5W SELECTION TABLE

Model Number	Output V Vdc Max	Full Load I mA Average	Ripple(max) Vp-p	Case Size
MM0.5*2.5W	500	5.0	1.0	B
MM1*2.5W	1,000	2.5	2.0	B
MM2*2.5W	2,000	1.25	4.0	B
MM3*2.5W	3,000	0.83	6.0	B
MM5*2.5W	5,000	0.5	10.0	C
MM10*2.5W	10,000	0.25	20.0	D
MM15*2.5W	15,000	0.17	30.0	D

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

MM 1.5W REVERSIBLE SELECTION TABLE

Model Number	Output V Vdc Max	Full Load I mA Average	Ripple(max) Vp-p	Case Size
MM0.5PN	500	3.0	1.0	E
MM1PN	1,000	1.5	2.0	E
MM1.5PN	1,500	1.0	3.0	E
MM2PN	2,000	0.75	4.0	F
MM3PN	3,000	0.5	6.0	F
MM5PN	5,000	0.3	10.0	F
MM10PN	10,000	0.1	20.0	G

Note: Polarity is achieved by grounding the opposite output pin.

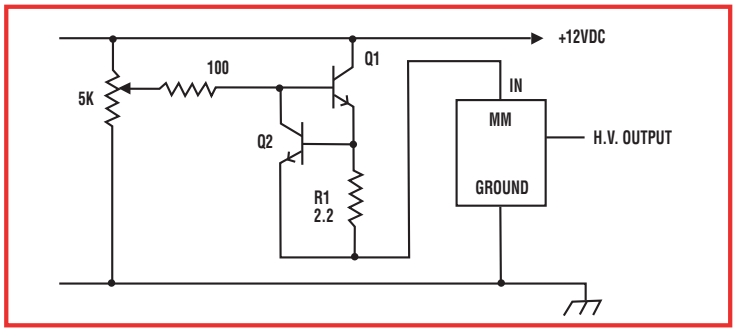
Shown here are some dc drive circuit ideas to regulate the high voltage output. It is always a good idea to incorporate current limiting as shown to allow for the occurrence of a continuous high voltage short circuit. This is sensed by R1 in the sample circuits.

NOTES

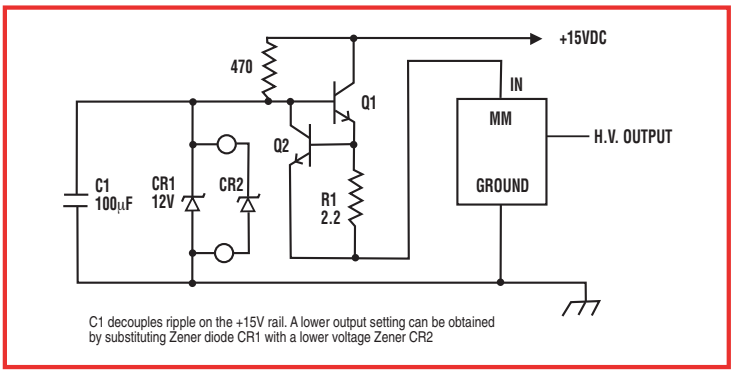
- The 1.5W MM module at full power draws a maximum of 250mA at 12V input (typically 180mA).
- The 2.5W MM module at full power draws a maximum of 380mA at 12V input (typically) 340mA).
- Output voltage is approximately proportional to the dc input voltage—allow for 1 to 2 volt drop across Q1.
- Transistor Q1 may need a heat sink
- The circuit shown in Circuit 3 is for positive output. Negative can be achieved with minimal changes in the circuit configuration.
- Please note that these circuits are suggestions only

APPLICATION NOTES

Circuit 1 This circuit allows control of the output voltage over its complete range and relies on a well regulated 12VDC Supply.

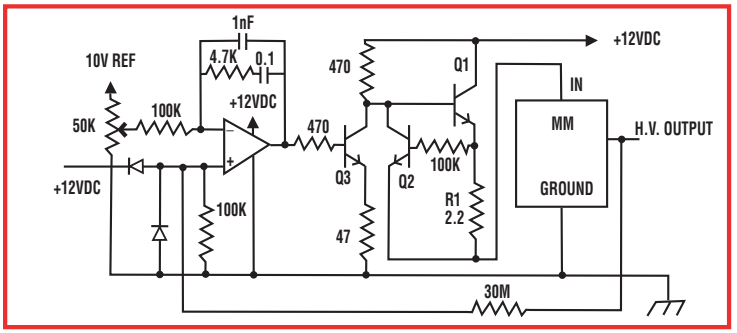


Circuit 2 This circuit is designed for fixed output voltages below the normal output voltage and has a line regulation of 5%/V (typical) change depending on the zener.

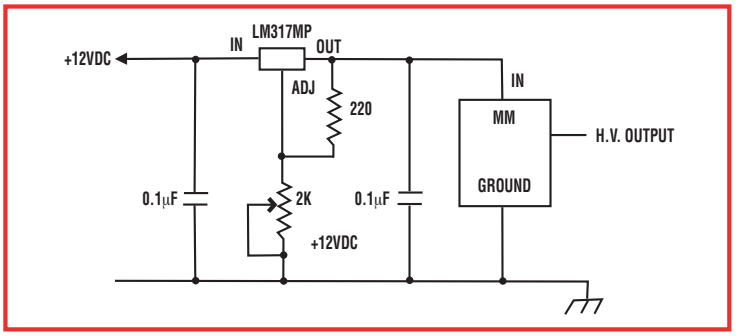


C1 decouples ripple on the +15V rail. A lower output setting can be obtained by substituting Zener diode CR1 with a lower voltage Zener CR2

Circuit 3 This circuit achieves a load regulation of 0.01% (typical) and a line regulation of 0.01% (typical) controlled over the complete range. (N.E. -positive output shown -see notes)



Circuit 4 This circuit allows for a full variable output voltage with a built-in current limit and achieves a line regulation of 0.05% (typical)



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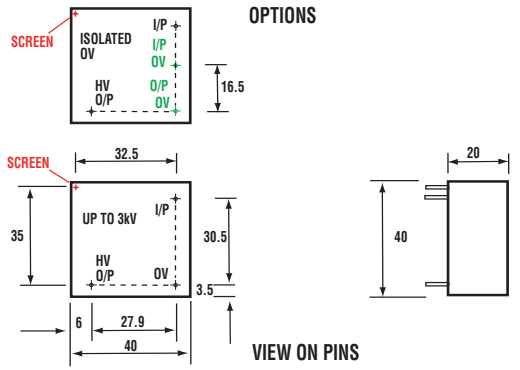
A



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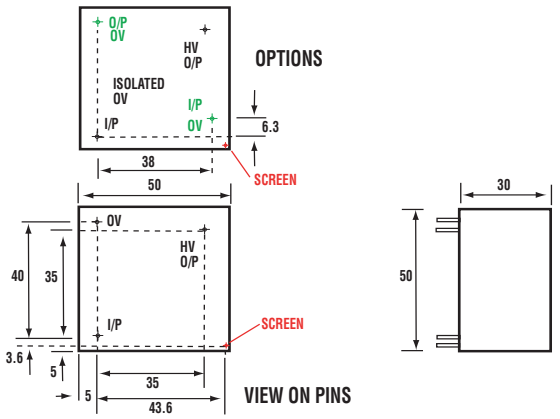
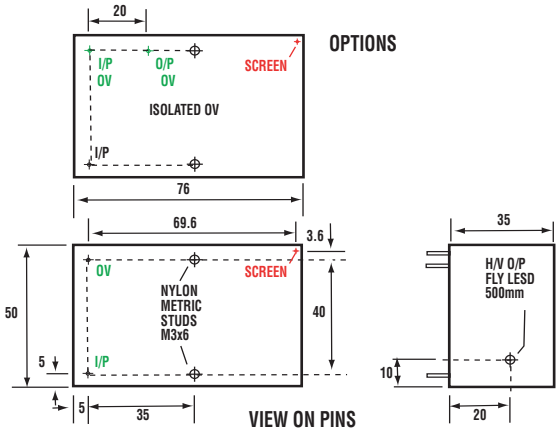


C



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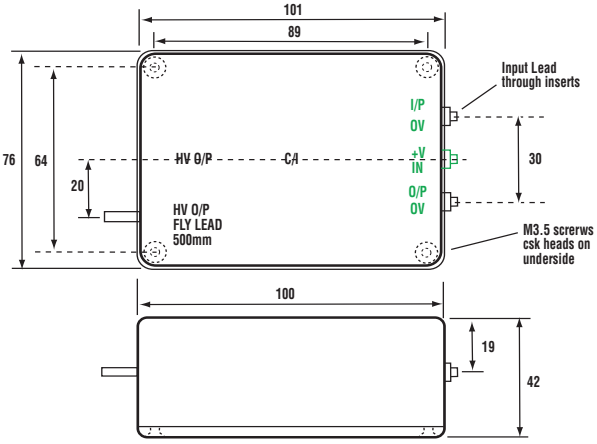

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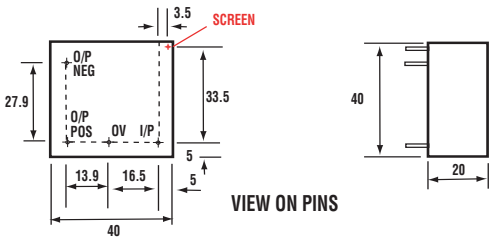

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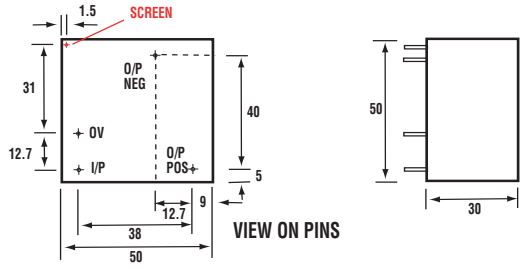

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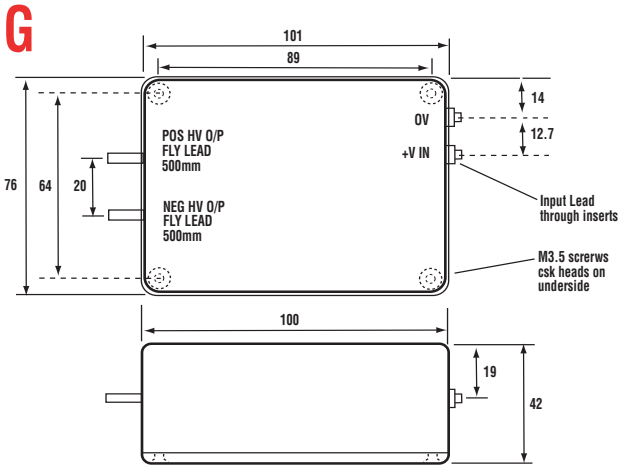

Standard configurations of housings for the MM Series modules.
Refer to case size reference in specifications on page 1.
Available options are shown in color; RED= Screen GREEN= Isolated I/P to O/P
Recommended hole size for pins- 1mm (case size A, B, E, F) 1.4mm (case size C.)

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- ***LOW COST***
- ***OUTPUT VOLTAGES UP TO 3KV***
- ***3 WATTS POWER RATING***
- ***REMOTE CONTROL***
- ***POSITIVE OR NEGATIVE POLARITY***
- ***ARC AND CONTINUOUS SHORT-CIRCUIT PROTECTED***
- ***LOW STORED ENERGY***
- ***HIGH RELIABILITY***
- ***INTERNAL 5V REFERENCE AVAILABLE***
- ***OEM CUSTOMIZATION AVAILABLE***

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
General applications where good performance up to 3 watts is required with size restraints

OPTIONS

P Preset Output Voltage
C External Programming
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.

Line Regulation:
< 0.005% for input change of 1 volt.

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

Output Voltage Control:
Option to be set at factory. Either:
1) Preset output voltage
2) External control:
External potentiometer (5Kohm)
Remote voltage programming 0-5V gives 0 to full output

Output Power: 3W continuous.

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

Ripple: < 0.01% p-p of full output voltage.

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).

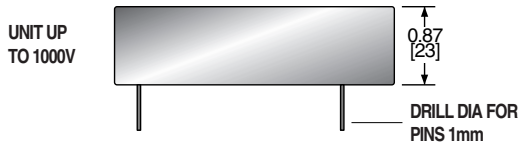
MS SELECTION TABLE

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

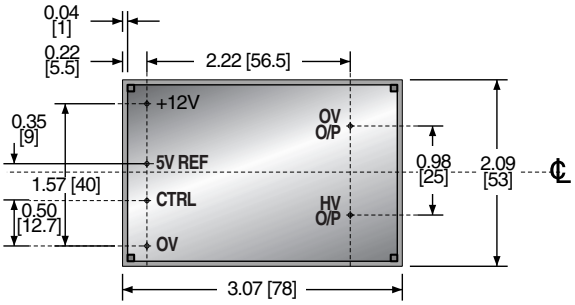
*Specify "P" for positive polarity or "N" for negative polarity.

DIMENSIONS: in.[mm]

SIDE VIEW

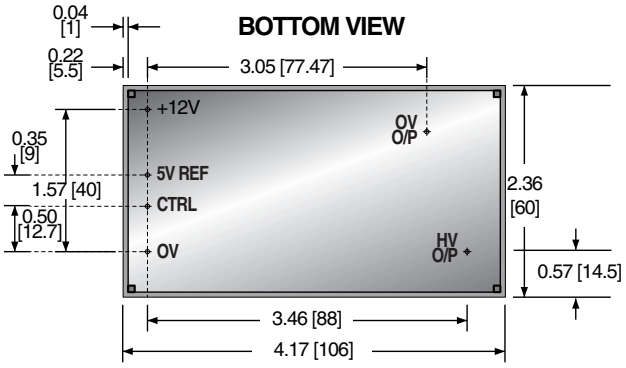


BOTTOM VIEW



SIDE VIEW

BOTTOM VIEW



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

89/336/EEC
73/23/EEC

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- ***500V TO 10KV @ 1.9W TO 4W***
- ***LOW COST MODULAR DESIGN***
- ***EXCELLENT STABILITY & REGULATION***
- ***LOW NOISE & RIPPLE***
- ***ARC & SHORT CIRCUIT PROTECTED***

Spellman's Bertan brand of PMT modular high voltage power supplies offer well regulated, fixed polarity outputs up to 10kV, 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 ± 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: ±12Vdc to ±18Vdc @ 400mA
specify "-1" (option 1) or "-3" (option 3) when ordering

Output Polarity:
Positive or negative, specify at time of order

Output Voltage:
See "model ratings" table

Output Current:
See "model ratings" table

Voltage Regulation:
Line: ±0.001% of rated output voltage for a +1% input line change

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

Ripple:
See "model ratings" table

Stability:
≤0.005% per hour, 0.02% per 8 hours, after a 1/2 hour warm up

Temperature Coefficient:
≤50ppm/°C

Arc/Short Circuit:
All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 120% of maximum dated output current.

Operating Temperature
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Interface Connector:
12 position card edge connector, mate provided with unit

Output Connector:
24˝ (610mm) of RG-59B/U shielded cable, unterminated

Cooling:
Convection cooled.

Dimensions:
3.875˝W X 1.25˝H X 6.3125˝D (98mm x32mm x 160mm)

Weight:
≤2.0 pounds (0.9kg)

MODEL RATINGS 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
PMT-100C-P,N	0 to 10kV	0 to 0.2mA	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 & 2	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, 100Ω Zin	8	8
Local Voltage Program	Internal program potentiometer wiper, O to 9Vdc	9	9

VOLTAGE MONITOR TABLE

Model	Signal Voltage	Signal Voltage
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
PMT-100C-P,N	0 to 5 volts	10k ohms

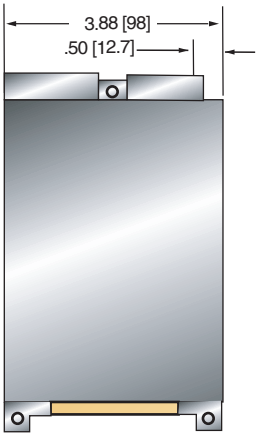
Note: The Voltage Monitor polarity matches the high voltage output polarity

CE 89/336/EEC 73/23/EEC

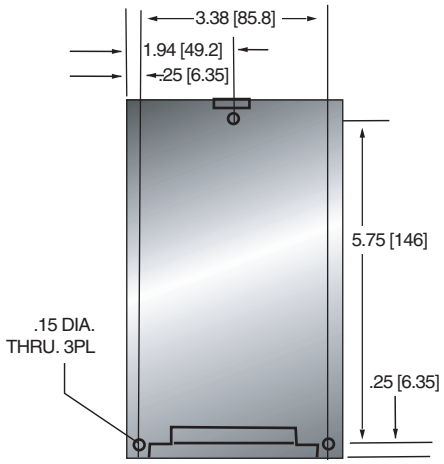
E137710
Up to 7.5kV only

DIMENSIONS: in.[mm]

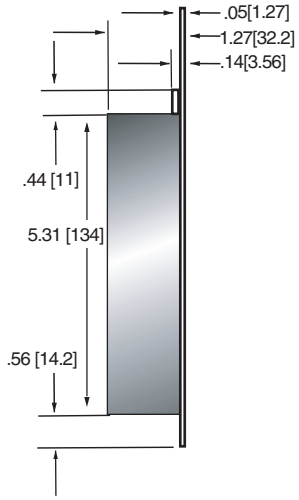
TOP VIEW



BOTTOM VIEW



FRONT VIEW



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- ***1-20KV @ 6-9 WATTS***
- ***DC INPUT MODULAR POWER SUPPLY***
- ***EXCELLENT REGULATION***
- ***VERY LOW RIPPLE***
- ***ARC/SHORT CIRCUIT PROTECTED***

Spellman's Bertan brand of 605C modular high voltage power supplies offer well regulated, fixed polarity outputs up to 20kV, which operate off a +28Vdc input (+24Vdc optional). These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:
+28Vdc, ±10%, @ 0.75 amp
+24Vdc, ±10%, @ 1 amp (24V Option)

Output Polarity:
Positive or negative, specify at time of order

Output Voltage:
See "model ratings" table

Output Current:
See "model ratings" table

Voltage Regulation:
Line: ±0.001% of rated output voltage over specified input voltage range
Load: ±0.002% of rated output voltage for a full load change

Ripple:
See "model ratings" table

Stability:
≤0.01% per hour, after a 1/2 hour warm up

Temperature Coefficient:
≤50ppm/°C

Arc/Short Circuit:
All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Interface Connector:
9 pin Molex connector, mating connector and pins provided

Output Connector:
59˝ (1.5 meter) detachable HV cable is provided

Cooling:
Convection cooled

Dimensions:
5.0˝H X 2.75˝W X 4.75˝D (128mm x 70mm x 121mm)

Weight:
≤3.2 pounds (1.45kg)

MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
605C-10P,N	0 to 1kV	0 to 9mA	15mV
605C-15P,N	0 to 1.5kV	0 to 6mA	15mV
605C-30P,N	0 to 3kV	0 to 3mA	30mV
605C-50P,N	0 to 5kV	0 to 1.5mA	50mV
605C-100P,N	0 to 10kV	0 to 0.75mA	200mV
605C-150P,N	0 to 15kV	0 to 0.4mA	450mV
605C-200P,N	0 to 20kV	0 to 0.25mA	750mV

Specify “P” for positive polarity or “N” for negative polarity

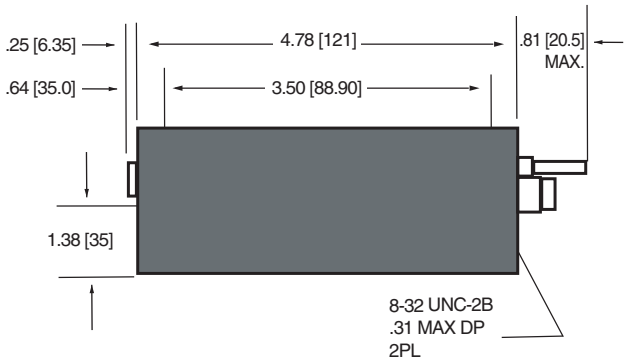
INTERFACE CONNECTOR-P2

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Ground	Power Ground
2	Power Input	+28Vdc Power Input (+24Vdc optional)
3	Signal Ground	Signal Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

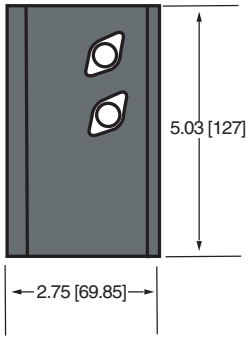
DIMENSIONS: in.[mm]

TOP VIEW

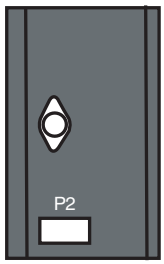
BOTTOM VIEW



FRONT VIEW



REAR VIEW



CE 89/336/EEC 73/23/EEC

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V-PAK 10W HIGH VOLTAGE POWER SUPPLY

- ***ULTRA COMPACT FOOTPRINT***
- ***DIFFERENTIAL INPUT FOR OUTPUT VOLTAGE PROGRAM***
- ***10 WATT OUTPUT POWER***
- ***OUTPUT VOLTAGE CONTROL***
- ***OUTPUT VOLTAGE AND CURRENT MONITOR***
- ***HIGH STABILITY WITH ULTRA LOW RIPPLE AND NOISE***
- ***10V PRECISION REFERENCE***
- ***SHUTDOWN MONITOR AND CONTROL***
- ***120% OUTPUT CURRENT LIMIT***

Spellman's V-Pak series are high performance 10W high voltage power supplies offering a variable output voltage up to 10kV. These small modules achieve extreme ruggedness and reliability with excellent long term stability with low ripple and noise characteristics. Additionally, the V-Pak features a differential amplifier input for the voltage programming signal to improve immunity from external system noise and addresses any offset issues. A fully featured analog user interface is provided via a 9-pin D-type connector. Spellman's proprietary HV technology coupled with SMT circuitry results in a small compact and lightweight module that is available in either a positive or negative polarity output.

TYPICAL APPLICATIONS

Photomultiplier Tubes
Electrostatics
Ion Guns
Spectroscopy
Precision Lenses
Electron Beam
Electrophoresis
Image Intensifiers

SPECIFICATIONS

Input:
+24VDC ± 0.5VDC

Input Current:
≤1 Amp

Output Voltage:
Up to 10kV

Output Polarity:
Positive or Negative, specify at time of order

Output Power:
10W

Voltage Regulation:
Line: ≤0.001% of rated output voltage over specified input voltage
Load: ≤0.001% of rated output voltage for full load change

Ripple:
See model selection table

Stability:
≤0.01% per hour, 0.02% per 8 hours after 1.0 hour warmup period

Precision Reference:
+10V ±1%, 10ppm $°C^{-1}$. Drift <15ppm per 1000 hours

Transient Response:
0.5% maximum recovering to 0.1% in <100ms for a step change of 10% to 90% to 10% of rated load.

Protection:
Output:
Arc and short circuit protection
Output Voltage limited to <120% of nominal maximum
Output current limited to <110% of nominal maximum
Soft starting current and voltage
Thermal protection shutdown

Input:
Over and under voltage protection.
Low input current protection

Temperature Coefficient:
≤25ppm/°C.

Operating Temperature:
0 to 45°C operating

Storage Temperature:
-35 to +85°C storage

Humidity:
10% to 90% RH, non-condensing

Cooling:
Additional heat sinking required to achieve continuous operation at full power

Dimensions:
0.79"H x 2.75"W x 2.75"D (20mm x 70mm x 70mm)

Weight:
<1.1 pounds (0.5kg)

Interface Connector:
9-pin D-type connector

Output Connector:
A captive 39.4″ (1m) screened flying lead

V-PAK MODEL SELECTION TABLE

V-PAK Series	Voltage	Current	Ripple
VP1*10/24	0 to 1kV	10.00mA	<5mV
VP2*10/24	0 to 2kV	5.00mA	<10mV
VP3*10/24	0 to 3kV	3.33mA	<15mV
VP5*10/24	0 to 5kV	2.00mA	<25mV
VP10*10/24	0 to 10kV	1mA	<50mV

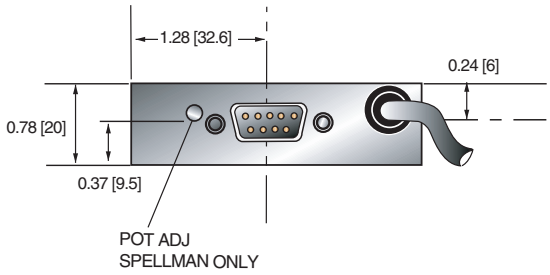
Specify "P" for positive polarity or "N" for negative polarity

V-PAK ANALOG INTERFACE— 9 PIN MALE D CONNECTOR

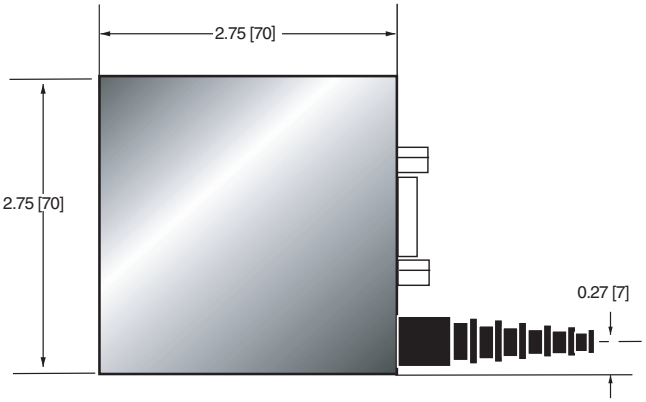
PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Input Ground	0V
2	Reference Output	+10VDC
3	Voltage Control Input +	0 to +10VDC with respect to pin 4
4	Voltage Control Input -	0 to -10VDC with respect to pin 3
5	Shutdown	Bi-directional; input >5V forces shutdown Output >5V indicates shutdown condition
6	Power Input +	24VDC
7	Ground (signal)	0V
8	Proportional I Monitor Output	0 to 10V ±5%, Z=1kΩ
9	Proportional V Monitor Output	0 to 10V ±5%, Z=1kΩ

DIMENSIONS: in.[mm]

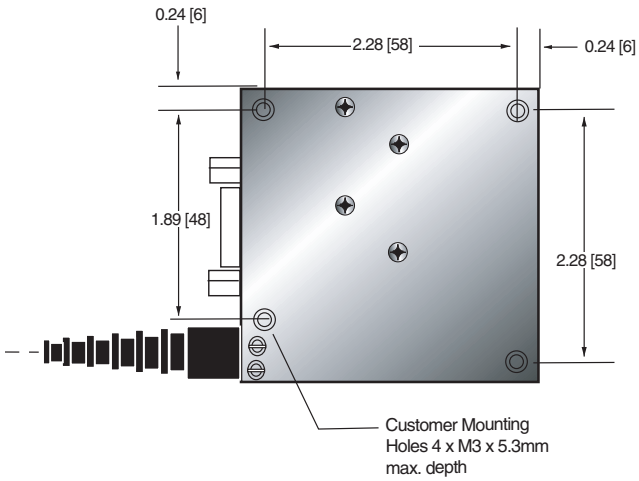
FRONT VIEW



TOP VIEW



BOTTOM VIEW



SIDE VIEW

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128063-001 REV.B
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- ***DIFFERENTIAL INPUT FOR VOLTAGE PROGRAM***
- ***OPTIONAL RS232/RS485 CONTROL***
- ***10 WATTS OUTPUT POWER***
- ***VOLTAGE AND CURRENT CONTROLS***
- ***VOLTAGE AND CURRENT MONITORS***
- ***HIGH STABILITY***
- ***ULTRA LOW RIPPLE AND NOISE***
- ***HIGH VOLTAGE ENABLE CONTROL***
- ***CE MARKED AND UL61010A-1 CERTIFIED***

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

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 RS232 or RS485 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
Microchannel Plate Detectors
Electronmultiplier Detectors
Scintillators
Mass Spectrometry
Electron and Ion Beams
Electrostatic Lenses
Nuclear Instruments
Electrostatic Printing

OPTIONS

VCC Variable Current Control
HS High Stability
DCC RS232 or RS485 Control

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

SPECIFICATIONS

Input Voltage:
+24 Vdc, ±2Vdc

Input Current:
≤1 amp maximum

Output Voltage:
8 models available from 1kV to 20kV

Output Polarity:
Positive or negative, specify at time of order

Power:
10 watts, maximum

Voltage Regulation:
Line: ≤0.001% of rated output voltage over specified input voltage
Load: ≤0.001% of rated output voltage for full load change

Current Regulation (Vcc Option):
Line: ≤0.01% for 1V input voltage change under any load conditions
Load: ≤0.01% for full load to short circuit

Ripple:
See "model selection" table

Stability:
≤0.01% per hour, 0.02% per 8 hours after 1.0 hour warm up period.
≤0.05% per 1000 hours after 1.0 hour warm up period (HS option)

Temperature Coefficient:
≤25ppm per degree C
≤10ppm 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)

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

Interface Connector:
15 pin male D connector

Output Connector:
A captive 39.4˝ (1 meter) long shielded HV cable is provided

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

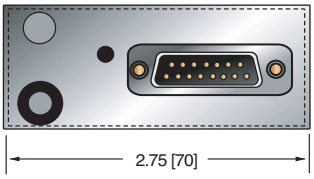
MPS SELECTION TABLE

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

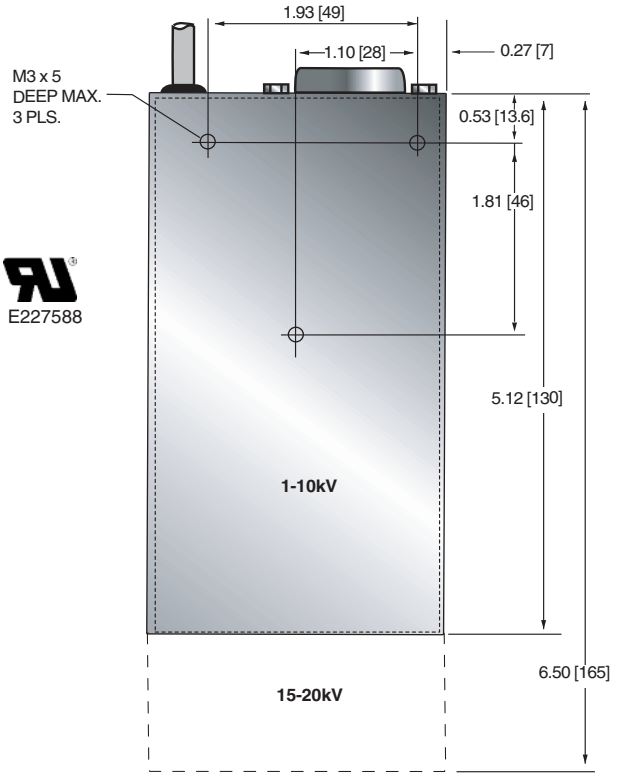
*Specify "P" for positive polarity or "N" for negative polarity.
Custom units available.

DIMENSIONS: in.[mm]

FRONT VIEW



BOTTOM VIEW



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E227588

SIDE VIEW

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www.spellmanhv.com
128033-001 REV.F
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- ***ARC AND SHORT-CIRCUIT PROTECTION***
- ***LOW OUTPUT RIPPLE - 0.001% P-P***
- ***LOCAL AND REMOTE VOLTAGE PROGRAMMING***
- ***10V REFERENCE OUTPUT FOR EXTERNAL CONTROL***
- ***HIGH STABILITY 0.001% LINE AND LOAD REGULATION***
- ***MODELS UP TO 40KV OUTPUT***
- ***CE MARK FOR EMC DIRECTIVE***
- ***OEM CUSTOMIZATION AVAILABLE***

The MP Series has been designed as high performance dc to dc converters with output voltages up to 40kV.

Each module provides well regulated, low ripple and high stability high voltage in a highly versatile compact design, combining linear and switched mode techniques to minimize internal dissipation and generated EMI/RFI interference. The higher voltage modules are vacuum encapsulated to ensure corona free operation.

Specialist cell manufacture of the MP Series ensures prompt delivery.

TYPICAL APPLICATIONS

Photomultiplier Tubes
Scintillators
Electron Guns
Ion Guns
Nuclear Instruments
Electrostatic lenses
Spectroscopy
Microchannel Plates

OPTIONS

F	Flange Mounting
P	Positive Output Polarity
N	Negative Output Polarity
LL	Optional Lead Length

SPECIFICATIONS

Input Voltage:
+24Vdc±2V. Other input voltages available on special order.

Input Current:
Less than 1A at full output.

Output Voltage:
Continuously adjustable over entire output range. Available in either positive or negative output polarity. See table for voltage ranges.

Output Voltage Control: Controlled by either:
1) Internal ten-turn potentiometer
2) External potentiometer 5k to 100k (set internal pot. to max.)
3) Remote differential voltage programming (0 to +10V gives 0 to full output).
Accuracy 0.1%.

Remote Control:
Remote programming Common Mode Range: -5VDC to +15VDC

Line Regulation:
0.001% for input change of 1V.

Load Regulation:
0.001% for 100µA to full load change (at maximum voltage).

Temperature Coefficient:
Better than 25ppm/°C.

Stability:
<0.007%/hr at constant operating conditions after 1 hour warm-up.

Output Voltage and Current Monitors:
Voltage: 0 to +10V represents zero to full output ±1%.
Current: 0 to +10V represents zero to full output ±2%.

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

Connectors:
Input: 10 pin connector (mating connector supplied).
Output: Output voltage 1-20kV: 500mm screened cable URM76
Output voltage 30kV: 500mm screened cable RG59
Output voltage 40kV: 500mm silicone rubber cable

DIMENSIONS: in.[mm]

Dimensions:

Stud mounted case

MP1 to MP5: 1.65"H x 3.86"W x 5.83"D (42mm x 98mm x 148mm)
MP10 to MP15: 1.65"H x 3.86"W x 7.48"D (42mm x 98mm x 190mm)
MP20 to MP30: 1.65"H x 3.86"W x 9.45"D (42mm x 98mm x 240mm)

Two M3 metric studs on case as standard
(mating hardware supplied)

Flange case

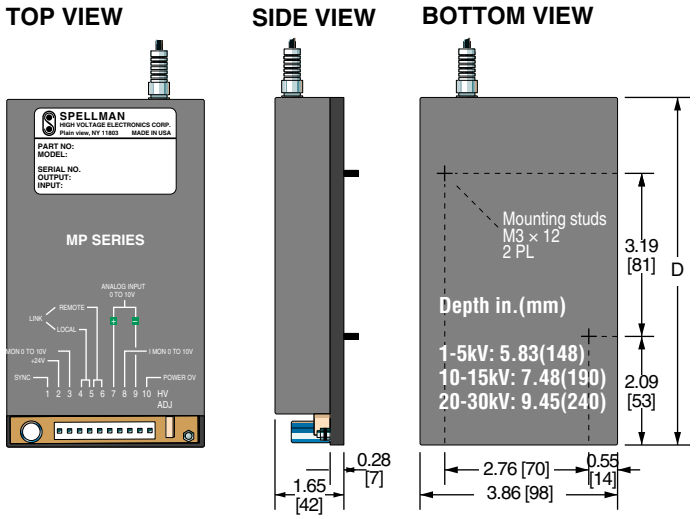
MP1 to MP5: 1.65"H x 3.86"W x 6.61" (42mm x 98mm x 168mm)
Fixing center: 6.14" (156mm)
MP10 to MP15: 1.65"H x 3.86"W x 8.27" (42mm x 98mm x 210mm)
Fixing center: 7.80" (198mm)
MP20 to MP30: 1.65"H x 3.86"W x 10.2" (42mm x 98mm x 260mm)
Fixing center: 9.77" (248mm)
MP40: 1.81"H x 3.86"W x 13.0" (46mm x 98mm x 330mm)
Fixing center: 12.5" (318mm)

(4 x 3.3mm mounting holes))

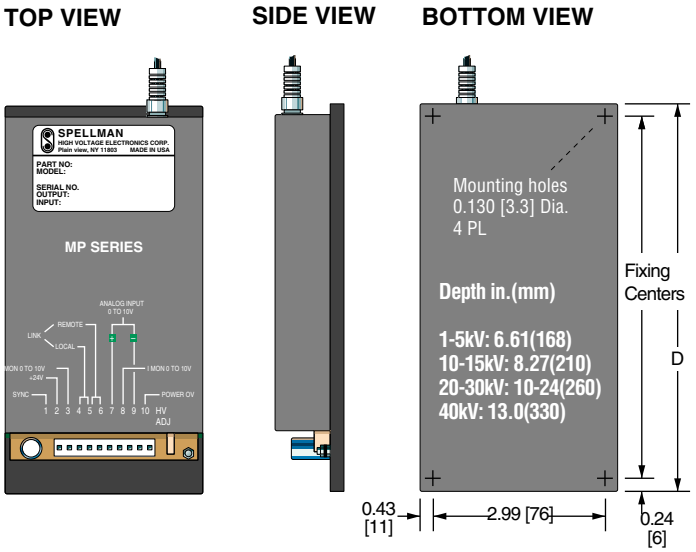
Weight:

MP1 to MP5: 21.18 oz. (600g)
MP10 to MP15: 35.3 oz. (1000g)
MP20 to MP30: 51.18 oz. (1450g)
MP40: 76.24 oz. (2160g)

STUD MOUNTING (standard)



FLANGE MOUNTING (optional)



MP SELECTION TABLE

OUTPUT VOLTAGE kV	MAX. CURRENT mA	RIPPLE (full load) mV	MODEL
0 to 1	10	10mV p-p	MP1*
0 to 1.5	6	10mV p-p	MP1.5*
0 to 2	5	10mV p-p	MP2*
0 to 2.5	4	10mV p-p	MP2.5*
0 to 3	3	10mV p-p	MP3*
0 to 5	2	20mV p-p	MP5*
0 to 10	1	100mV p-p	MP10*
0 to 15	0.60	150mV p-p	MP15*
0 to 20	0.50	200mV p-p	MP20*
0 to 30	0.33	300mV p-p	MP30*
0 to 40	0.2	400mV p-p	MP40*

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

MP CONNECTOR 10 PIN

TB1	SIGNAL	TB1	SIGNAL
1	Synchronization	6	Remote Control
2	+24V Input	7	Vprog+
3	Voltage Monitor	8	Current Monitor
4	Local Control	9	Vprog-
5	Remote / Local Link	10	Power Ground

CE 89/336/EEC 73/23/EEC

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- ***MODULAR BENCH TOP DESIGN***
- ***LOW RIPPLE AND NOISE***
- ***3.5 DIGIT FRONT PANEL DIGITAL METERING***
- ***REVERSIBLE OUTPUT POLARITY***

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 15 watt 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

SPECIFICATIONS

Input Voltage:
115Vac, ±10%, 50/60 Hertz @ 0.5 amp
230Vac, ±10%, 50/60 Hertz @ 0.25 amps
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

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:
≤10 pounds (4.5kg)

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	2 volts
230-30R	0 to 30kV	0 to 0.4mA	5 volts

INTERFACE CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
2	n/c	none
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

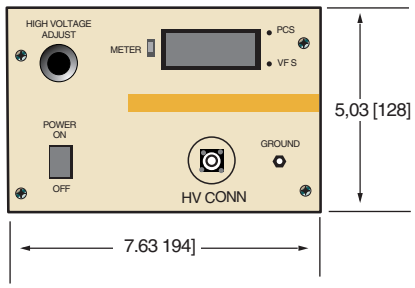
OPTIONS:

Isolated (Floating) Output-Option F

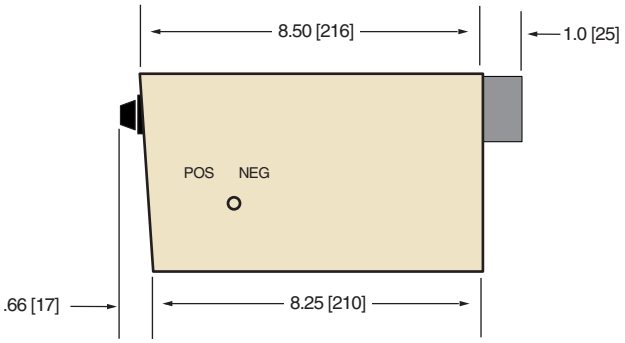
Units up to and including 5kV can be provided with differential outputs capable of floating up to ±2kV from ground. Voltage programming and monitoring functions normally referenced to ground. Current monitoring and metering is eliminated. Replace "R" suffix with "F" for this option.

DIMENSIONS: in.[mm]

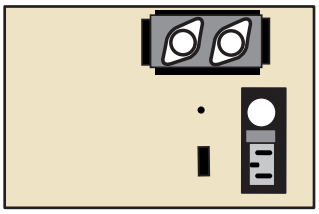
FRONT VIEW



SIDE VIEW



BACK VIEW



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- ***1-20KV @ 10-15 WATTS***
- ***AC INPUT MODULAR POWER SUPPLY***
- ***115/230 VAC SELECTABLE***
- ***EXCELLENT REGULATION***
- ***VERY LOW RIPPLE***
- ***ARC/SHORT CIRCUIT PROTECTED***

Spellman's Bertan brand of 602C modular high voltage power supplies offer well regulated, fixed polarity outputs up to 20kV, that operate off a standard switch selectable 115/230Vac input. These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:
115Vac, ±10%, 50/60 Hertz @ 0.5 amp
230Vac, ±10%, 50/60 Hertz @ 0.25 amp
Input voltage is fused and switch selectable

Output Polarity:
Positive or negative, specify at time of order

Output Voltage:
See "model ratings" table

Output Current:
See "model ratings" table

Voltage Regulation:
Line - ±0.001% of rated output voltage over specified input voltage range
Load - ±0.002% of rated output voltage for a full load change

Ripple:
See "model ratings" table

Stability:
≤0.01% per hour, after a 1/2 hour warm up

Temperature Coefficient:
≤50ppm/°C

Arc/Short Circuit:
All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Interface Connector:
9 pin Molex connector, mating connector and pins provided

AC Input Line Connector:
3 position terminal block

Output Connector:
10´ (3 meter) detachable HV cable is provided for units up to 5kV; 10kV through 20kV: 59˝ (1.5 meter) cable.

Cooling:
Convection cooled.

Dimensions:
5.0´H X 3.1´W X 8.7´D (128mm x 78mm x 220mm)

Weight:
≤6.75 pounds (3.1kg)

MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
602C-10P,N	0 to 1kV	0 to 15mA	15mV
602C-15P,N	0 to 1.5kV	0 to 10mA	15mV
602C-30P,N	0 to 3kV	0 to 5mA	30mV
602C-50P,N	0 to 5kV	0 to 2mA	50mV
602C-100P,N	0 to 10kV	0 to 1mA	200mV
602C-150P,N	0 to 15kV	0 to 0.6mA	450mV
602C-200P,N	0 to 20kV	0 to 0.5mA	800mV

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

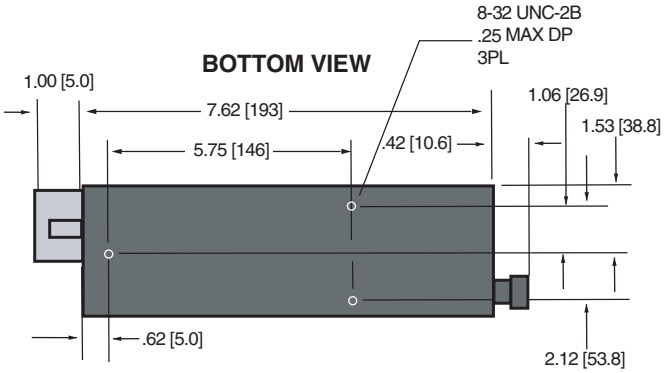
DIMENSIONS: in.[mm]

TOP VIEW

INTERFACE CONNECTOR-P2

PIN	SIGNAL	SIGNAL PARAMETERS
1	n/c	None
2	n/c	None
3	Signal Ground	Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

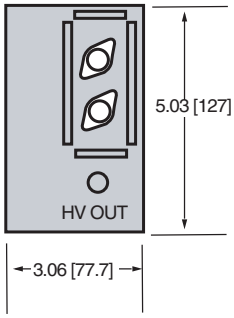
BOTTOM VIEW



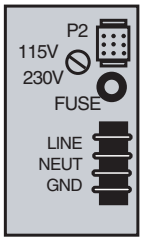
AC INPUT TERMINAL BLOCK

Terminal	Function
1	115/230 Vac Input
2	Neutral
3	Ground

FRONT VIEW



REAR VIEW



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- ***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***

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, ±2Vdc

Input Current:
≤1.5 amps

Output Voltage:
5 models available from 1kV to 10kV

Output Polarity:
Positive or negative, specify at time of order

Power:
≤20 watts

Voltage Regulation:
Line: ≤0.001% of rated output voltage over specified input voltage
Load: ≤0.001% of rated output voltage for full load change

Current Regulation (Vcc Option):
Line: ≤0.01% for 1V input voltage change under any load conditions
Load: ≤0.001% for 0 to full load

Ripple:
See "model selection" table

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: -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

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

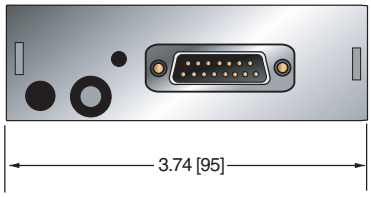
*Specify "P" for positive polarity or "N" for negative polarity.
Custom units available.

MPS20W ANALOG INTERFACE— 15 PIN D CONNECTOR

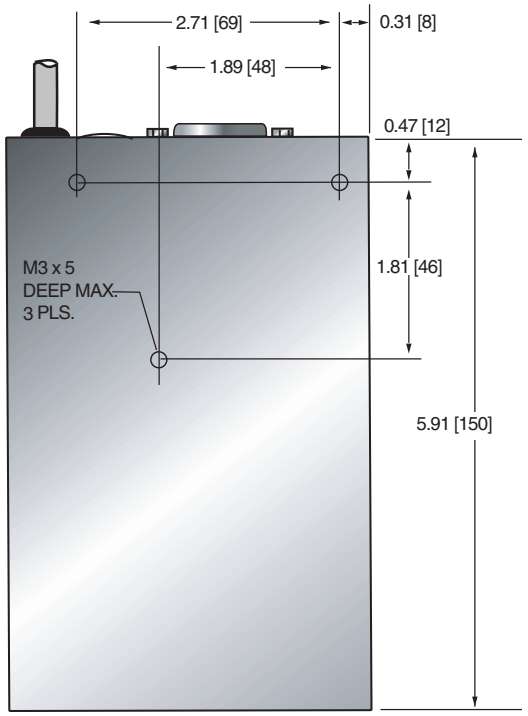
PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1.5 amp maximum
3	Voltage Monitor Output	0 to 10Vdc=0 to 100% Rated Output, Zout =2.2kΩ
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
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

DIMENSIONS: in.[mm]

FRONT VIEW



BOTTOM VIEW



SIDE VIEW

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- *1-30KV @ 12-30 WATTS*
- *AC INPUT MODULAR POWER SUPPLY*
- *115/230 VAC SELECTABLE*
- *EXCELLENT REGULATION*
- *VERY LOW RIPPLE*
- *ARC AND SHORT CIRCUIT PROTECTED*

Spellman's Bertan brand of 603C modular high voltage power supplies offer well regulated, fixed polarity outputs up to 30kV, that operate off a standard switch selectable 115/230Vac input. These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:
115Vac, ±10%, 50/60 Hertz @ 1.0 amp
230Vac, ±10%, 50/60 Hertz @ 0.5 amp
Input voltage is fused and switch selectable

Output Polarity:
Positive or negative, specify at time of order

Output Voltage:
See "model ratings" table

Output Current:
See "model ratings" table

Voltage Regulation::
Line: ±0.001% of rated output voltage over specified input voltage range
Load: ±0.002% of rated output voltage for a full load change

Ripple:
See "model ratings" table

Stability:
≤0.01% per hour, after a 1/2 hour warm up

Temperature Coefficient:
≤50ppm/°C

Arc/Short Circuit:
All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Interface Connector:
9 pin Molex connector, mating connector and pins provided

AC Input Line Connector:
3 position terminal block

Output Connector:
10´ (3 meter) detachable HV cable is provided for units up to 5kV; 10kV through 20kV: 59˝ (1.5 meter) cable, 30kV: 78˝ (2 meter) cable

Cooling:
Convection cooled

Dimensions:
5.0´H X 5.5´W X 8.5´D (127mm x 140mm x 216mm)

Weight:
≤8.0 pounds (3.64kg)

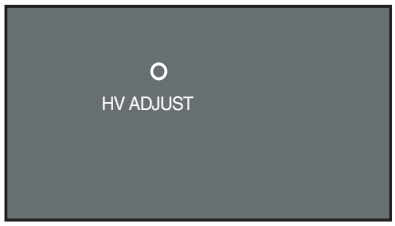
MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
603C-10P,N	0 to 1kV	0 to 30mA	15mV
603C-15P,N	0 to 1.5kV	0 to 20mA	15mV
603C-30P,N	0 to 3kV	0 to 10mA	30mV
603C-50P,N	0 to 5kV	0 to 5mA	50mV
603C-100P,N	0 to 10kV	0 to 2mA	200mV
603C-150P,N	0 to 15kV	0 to 1.5mA	450mV
603C-200P,N	0 to 20kV	0 to 1.0mA	800mV
603C-300P,N	0 to 30kV	0 to 0.4mA	6 volts

Specify “P” for positive polarity or “N” for negative polarity

DIMENSIONS: in.[mm]

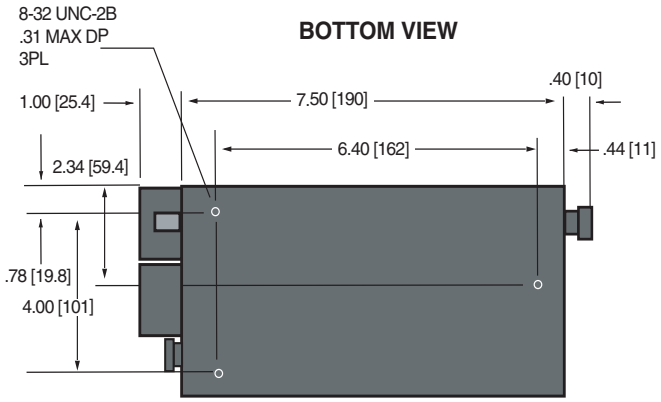
TOP VIEW



INTERFACE CONNECTOR-P2

PIN	SIGNAL	SIGNAL PARAMETERS
1	n/c	None
2	n/c	None
3	Signal Ground	Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

BOTTOM VIEW



AC INPUT TERMINAL BLOCK

Terminal	Function
1	115/230 Vac Input
2	Neutral
3	Ground

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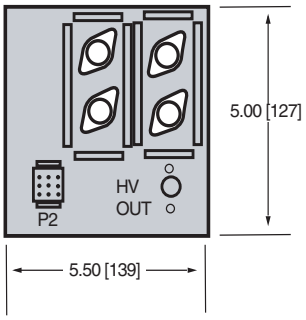
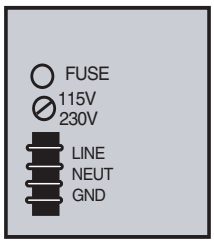
E137710

FRONT VIEW



REAR VIEW



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EPM 30W POWER SUPPLY

- COMPACT PACKAGE
- VOLTAGE AND CURRENT PROGRAMMING FROM ZERO TO RATED OUTPUT
- TEST POINTS FOR OUTPUT CURRENT AND VOLTAGE
- OVERVOLTAGE PROTECTION
- CONTROL OF OUTPUT VIA ENABLE/INHIBIT SIGNAL
- OEM CUSTOMIZATION AVAILABLE

The EPM Series of power supplies utilize proprietary circuitry which yields full output current from near zero to maximum output voltage. Current regulation is standard on all models and is particularly valuable in applications that require a current source into the load.

TYPICAL APPLICATIONS

Electrophoresis
Electron Beam
Ion Source
Photomultipliers
Laboratory Applications

SPECIFICATIONS

Input:
+24Vdc ±10%

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

Voltage Regulation:
Load:
Static: 0.02% of output voltage for a full load change.
Dynamic: 10V/100µA.
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 output voltage.

Dimensions:
2"H x 5.7"W x 5.7"D (5.1cm x 14.5cm x 14.5cm)

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

Output Cable:
18" ±1" (45.7cm) 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:
10V±2% = Max. rated output.

Current Test Point:
10V±2% = Max. rated output.

Remote Enable:
>3.4V= HV ON.
<1.0V or open= HV OFF.

CE 89/336/EEC 73/23/EEC

EPM SELECTION TABLE

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

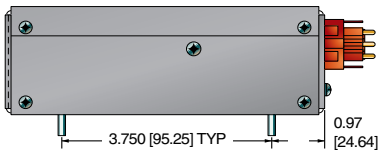
*Specify "P" for positive polarity or "N" for negative polarity.

EPM CONNECTOR 9 PIN

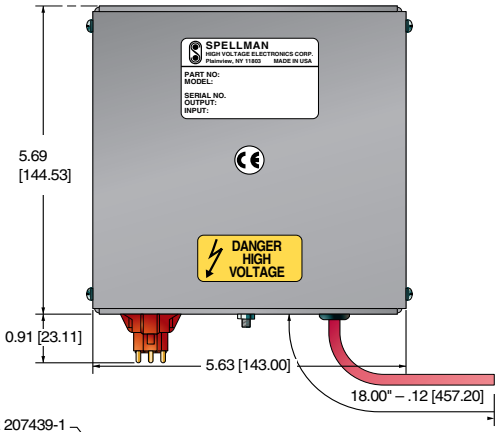
J1	SIGNAL	J1	SIGNAL
1	Ground	6	Voltage Programming
2	+24Vdc	7	Current Programming
3	High Voltage Enable/Inhibit	8	+10Vdc Reference
4	Voltage Test Point	9	Program and Test Point Return
5	Current Test Point		

DIMENSIONS: in.[mm]

SIDE VIEW

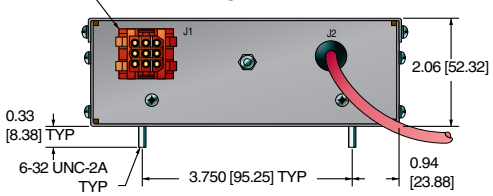


TOP VIEW



AMP CONNECTOR 207439-1
WITH MALE PIN 66591-1

FRONT VIEW



- ***1-30KV @ 12-30 WATTS***
- ***DC INPUT MODULAR POWER SUPPLY***
- ***EXCELLENT REGULATION***
- ***VERY LOW RIPPLE***
- ***ARC SHORT CIRCUIT PROTECTED***

Spellman's Bertan brand of 606C modular high voltage power supplies offer well regulated, fix polarity outputs up to 30kV, which operate off a +28Vdc input (+24Vdc optional). These fully enclosed modules are designed for bench top or OEM applications like spectrometers, detectors, imaging and electron beam usage.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally ground referenced output voltage and current monitor signals are provided. A high voltage enable signal input allows remote control of the supply.

TYPICAL APPLICATIONS

Spectrometers
Detectors

SPECIFICATIONS

Input Voltage:
+28Vdc, ±10%, @ 2.25 amps
+24Vdc, ±10%, @ 2.5 amps (24V Option)

Output Polarity:
Positive or negative, specify at time of order

Output Voltage:
See "model ratings" table

Output Current:
See "model ratings" table

Voltage Regulation
Line: ±0.001% of rated output voltage over specified input voltage range
Load: ±0.002% of rated output voltage for a full load change

Ripple:
See "model ratings" table

Stability:
≤0.01% per hour, after a 1/2 hour warm up

Temperature Coefficient:
≤50ppm/°C

Arc/Short Circuit:
All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 110% of maximum rated output current.

Operating Temperature:
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Interface Connector:
9 pin Molex, mating connector and pins provided

Output Connector:
10´ (3 meter) detachable HV cable is provided for units up to 5kV; 10kV through 20kV: 59˝ (1.5 meter) cable; 30kV: 78˝ (2 meter) cable

Cooling:
Convection cooled

Dimensions:
5.0´H X 5.50´W X 4.75´D (128mm x 140mm x 121mm)

Weight:
≤3.2 pounds (1.45kg)

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MODEL RATINGS TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
606C-10P,N	0 to 1kV	0 to 30mA	15mV
606C-15P,N	0 to 1.5kV	0 to 20mA	15mV
606C-30P,N	0 to 3kV	0 to 10mA	30mV
606C-50P,N	0 to 5kV	0 to 5mA	50mV
606C-100P,N	0 to 10kV	0 to 2mA	200mV
606C-150P,N	0 to 15kV	0 to 1.5mA	450mV
606C-200P,N	0 to 20kV	0 to 1.0mA	800mV
606C-300P,N	0 to 30kV	0 to 0.4mA	6 volts

Specify “P” for positive polarity or “N” for negative polarity

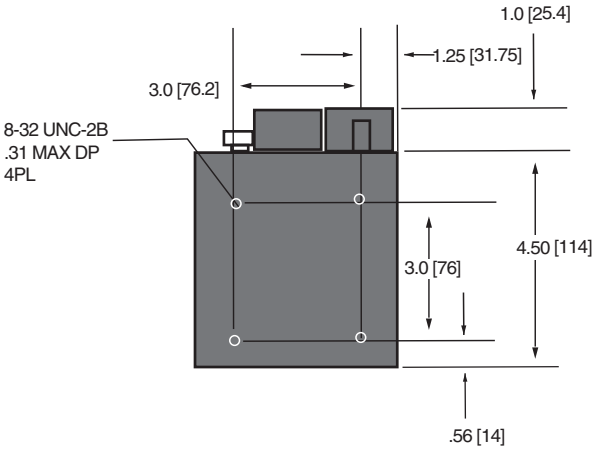
INTERFACE CONNECTOR-P2

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Ground	Power Ground
2	Power Input	+28Vdc Power Input (+24Vdc optional)
3	Signal Ground	Signal Ground
4	Voltage Program	0 to 5Vdc = 0 to 100% rated output, 1MΩ Zin
5	+5.0Vdc Reference	+5.0Vdc, 10mA maximum
6	kV Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
7	mA Monitor	0 to 5Vdc = 0 to 100% rated output, 10KΩ Zout
8	Trip Input	Connect to ground to trip unit off
9	Local Voltage Program	Internal program potentiometer wiper, 0 to 5Vdc

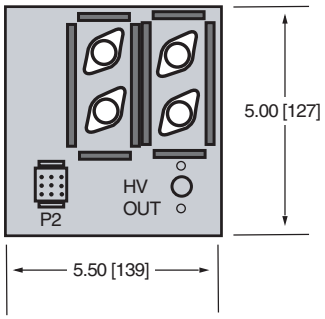
DIMENSIONS: in.[mm]

TOP VIEW

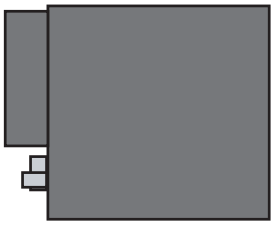
BOTTOM VIEW



FRONT VIEW



REAR VIEW



CE 89/336/EEC 73/23/EEC

SMS 60W POWER SUPPLY

- ***OUTPUT VOLTAGES FROM 1KV TO 60KV***
- ***LOW STORED ENERGY***
- ***TEST POINTS FOR OUTPUT CURRENT AND VOLTAGE***
- ***INHIBIT CONTROL OF OUTPUT VIA TTL SIGNAL***
- ***OEM CUSTOMIZATION AVAILABLE***

Spellman's SMS Series is based on a resonant flyback circuit that provides over 80% efficiency and high pulse current capability. Featuring voltage and current regulation with automatic crossover, The SMS is arc and short circuit protected making it ideal for a variety of applications.

TYPICAL APPLICATIONS

CRT Testing
X-ray Analysis
Electrophoresis
Detector Arrays
Cable Testing

SPECIFICATIONS

Input:
+24Vdc ±10%

Output:
10 models from 1kV to 60kV. Positive or negative polarity outputs.

Voltage Regulation:

Load:
Static: 0.01% of output voltage no load to full load.
Dynamic: 10V/100µA

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.

Ripple:
0.1% p-p of maximum output voltage.

Dimensions:
3˝H x 5˝W x 9˝D (7.6cm x 12.7cm x 23.0cm).

Input Connector:
12 pin AMP Metri-Mate

Output Cable:
18˝±1˝ (45.7cm) of UL® approved high voltage wire.

Voltage Stability:
0.02% per 8 hours.

Voltage Temperature Coefficient:
0.01% per °C, voltage or current regulated.

SMS SELECTION TABLE

Maximum Rating		Model Number
kV	mA	
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

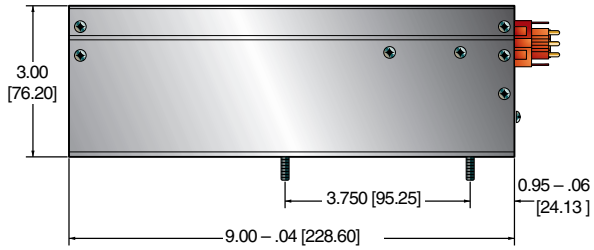
*Specify "P" for positive polarity or "N" for negative polarity.

CONNECTOR 12 PIN

J1	SIGNAL
1	Ground
2	+24Vdc
3	High Voltage Enable/Inhibit
4	Voltage Test Point: 10V±2%=0 to Rated Output
5	Current Test Point: 10V±2%=0 to Rated Output
6	Voltage Programming
7	Current Programming
8	+10Vdc Reference
9	Program and Test Point Return
10-12	Spare

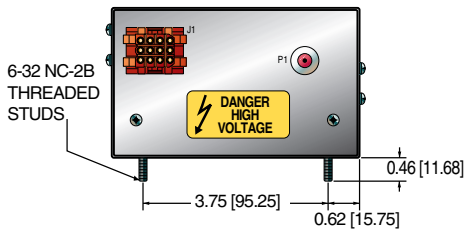
DIMENSIONS: in.[mm]

SIDE VIEW



TOP VIEW

BACK VIEW



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PCM 120W POWER SUPPLY

- OUTPUT VOLTAGE FROM 1KV TO 70KV
- POWER FACTOR CORRECTED
- UNIVERSAL INPUT
- TEST POINTS FOR OUTPUT CURRENT AND VOLTAGE
- POWER ON, INTERLOCK CLOSED AND FAULT INDICATORS
- FILAMENT POWER SUPPLY AVAILABLE ON SPECIAL ORDER
- OEM CUSTOMIZATION AVAILABLE

Spellman's PCM Series of high voltage power supplies are well regulated with output voltages from 1kV to 70kV. These supplies feature universal AC input (85-265Vac) and power factor correction. They are designed with a resonant circuit that provides high efficiency and high pulse current capability up to 400W peak. The PCM Series incorporates local and remote programming, monitoring and fault indicators with safety interlock, and short-circuit and overload protection.

TYPICAL APPLICATIONS

Electrophoresis
X-ray Inspection
Detector Arrays
Capacitor Charging

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

Output:
11 models from 1kV to 70kV. Positive or negative polarity outputs.

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.

Ripple:
0.1% p-p of maximum output voltage.

Voltage Stability:
0.02% per 8 hours.

Voltage Temperature Coefficient:
100ppm per °C, voltage or current regulated.

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).

Connectors:
AC Input: IEC320 with mating cable.
Signal: 15pin D connector.

HV Output Cable:
Spellman Delrin type connector with 36" (91.4cm) shielded cable.

89/336/EEC
73/23/EEC

E148969
Up to 60kV only

PCM SELECTION TABLE

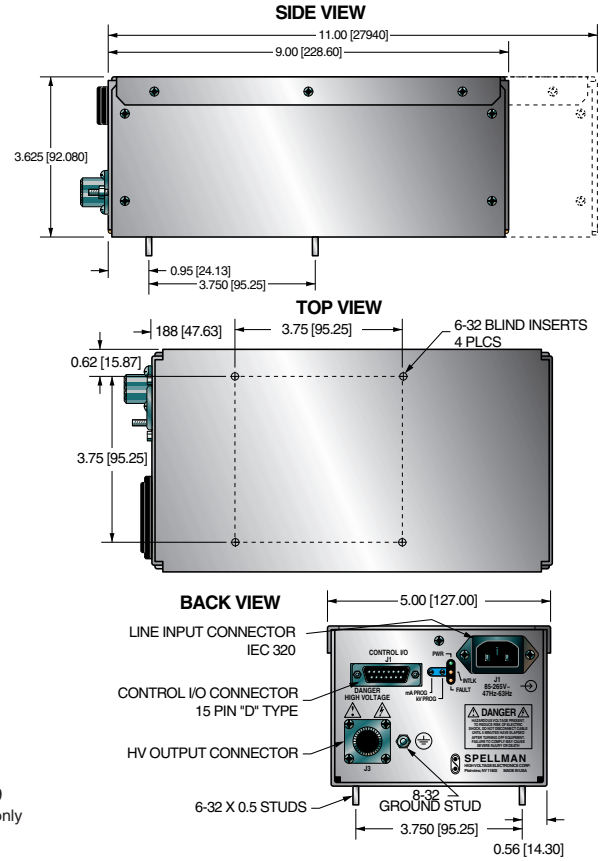
Maximum Rating		Model Number	Maximum Rating		Model Number
kV	mA		kV	mA	
1	120	PCM 1*120	30	4	PCM 30*120
3	40	PCM 3*120	40	3	PCM 40*120
5	24	PCM 5*120	50	2.4	PCM 50*120
10	12	PCM 10*120	60	2	PCM 60*120
15	8	PCM 15*120	70	1.7	PCM 70*120
20	6	PCM 20*120			

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

PCM D CONNECTOR 15 PIN

J1	SIGNAL	J1	SIGNAL
1	Remote mA Program	9	Power Supply Fault
2	Remote kV Program	10	+10V Reference
3	Enable (L)/Disable(H)	11	Signal Return
4	mA Monitor	12	Spare
5	Interlock Return	13	Spare
6	Interlock	14	Spare
7	kV Monitor	15	Local mA Program
8	Local kV Program		

DIMENSIONS: in.[mm]



- ***MODULAR BENCH TOP DESIGN***
- ***115/220 VAC SWITCHABLE***
- ***DIFFERENTIAL INPUT PROGRAMMING***

Spellman's Bertan brand of 825 Series high voltage power supplies provide well-regulated, fixed polarity outputs from 500 to 50kV that operate off a standard switch-selectable 115/230Vac input. The 825 Series is fully arc and short circuit protected. Excellent regulation specifications are featured along with outstanding stability performance.

TYPICAL APPLICATIONS

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

SPECIFICATIONS

Input Voltage:
90 - 135Vac, ±10%, 50/60 Hertz @ 2 amps
185 - 265Vac, ±10%, 50/60 Hertz @ 1.5 amps
Input voltage is switch selectable

Output Voltage:
See "model selection" table

Output Polarity:
Positive or negative, specify at time of order

Output Current:
See "model selection" table

Voltage Regulation:
Line: ±(0.01% of setting + 0.01% of maximum) for ±10% input line change.

Load: ±(0.02% of setting + 0.02% of maximum) for FL-NL and NL-FL change.

Current Regulation:
Line: ±(0.05% of setting + 0.05% of maximum) for ±10% input line change.rated full current.
Load: ±(0.1% of setting + 0.1% of maximum) for 0 to maximum rated output voltage change.

Ripple:
0.1% of setting + 0.1% of maximum, peak-to-peak.

Temperature Coefficient:
Constant voltage operation:
±(50ppm of setting + 50ppm of maximum)/°C
Constant current operation:
±(100ppm of setting + 100ppm of maximum)/°C

Stability: (1/2 hour warm up)
Constant voltage operation:
±(0.01% of setting + 0.01% of maximum)/hr.; ±(0.02% of setting + 0.02% of maximum)/8 hrs.
Constant current operation: ±(0.02% of setting + 0.02% of maximum)/hr.; ±(0.04% of setting + 0.04% of maximum)/8 hrs.

Internal Controls:
Independent precision multi-turn potentiometers for voltage and current control. The resolution of each control is 0.05% of maximum. The potentiometers are screwdriver-adjustable and easily accessed.

Remote Programming:
Two independent 0 to 5Vdc inputs for 0 to maximum voltage and current outputs. Accuracy is ±(0.2% of setting + 0.2% of maximum). The programming input impedance is greater than 1MΩ. The program inputs are differential; this feature provides user-defined program voltage polarity and eliminates ground loops.

Voltage Monitor:
0 to +5Vdc proportional to 0 to maximum output high voltage. Accuracy is ±(0.2% of reading + 0.2% of maximum). The monitor output impedance is 10kΩ ±1%.

Current Monitor:
0 to +5Vdc proportional to 0 to maximum output current. Accuracy is ±(0.5% of reading + 0.2% of maximum). The monitor output impedance is 10kΩ ±1%.

Enable:
TTL compatible. Remote "high" signal disables high voltage, remote low enables high voltage. The enable input must be pulled low to allow operation of high voltage regardless of whether supply is in local or remote mode.

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:
25 pin "D" connector, a mating connector is provided

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Output Connector:
A detachable 10 foot (3 meter) HV cable is provided

Cooling:
Internal fan. Speed of fan is output power-dependent.

Dimensions
10.00˝ W X 3.19˝ H X 10.75˝ D
(254mm X 81mm X 273mm)

Weight:
13 pounds (8.8kg)

MODEL SELECTION TABLE

825 Series	Voltage	Current	Ripple
825-0.5N/P	0 to 500V	0 to 400mA	1V
825-1N/P	0 to 1kV	0 to 200mA	2V
825-1.5N/P	0 to 1.5kV	0 to 133mA	3V
825-3N/P	0 to 3kV	0 to 66mA	6V
825-5N/P	0 to 5kV	0 to 40mA	10V
825-10N/P	0 to 10kV	0 to 20mA	20V
825-20N/P	0 to 20kV	0 to 10mA	40V
825-30N/P	0 to 30kV	0 to 6.6mA	60V
815-50N/P	0 to 50kV	0 to 4mA	100V

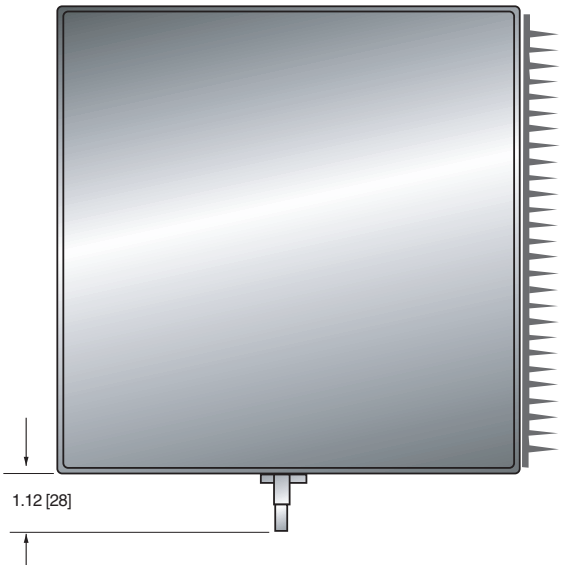
INTERFACE CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Vout Program Input (+)	0 to +5Vdc differential between pin 1 and pin 2 = 0 to 100% of rated Vout
2	Vout Program Input (-)	0 to +5Vdc differential between pin 1 and pin 2 = 0 to 100% of rated Vout
3	Vout Program Output	0 to +5Vdc = 0 to 100% rated voltage
4	Vout Monitor	0 to +5Vdc = 0 to 100% rated voltage, Zout =10kΩ
5	Common (Vmon & Vref Return)	Ground
6	Vreference Output	+5.0VDC @ 10mA, maximum
7	NC	none
8	NC	none
9	NC	none
10	Logic Common	Ground
11	/Enable Input	TTL “0” enables high voltage output, defaults to disabled status if left unconnected
12	Remote/Enable Output	TTL “1” indicates high voltage is enable, TTL “0” indicates high voltage is disabled
13	V Mode and I/Mode Output	TTL “1” indicates voltage mode operation, TTL “0” indicates current mode operation,
14	Iout Program Input (+)	0 to +5Vdc differential between pin 14 and pin 15 = 0 to 100% of rated Iout
15	Iout Program Input (-)	0 to +5Vdc differential between pin 14 and pin 15 = 0 to 100% of rated Iout
16	Iout Program Output	0 to +5Vdc differential = 0 to 100% of rated current
17	Iout Monitor	0 to +5Vdc = 0 to 100% rated voltage, Zout =10kΩ
18	Iout Common (Iout Monitor Return)	Ground
19	Analog Common	Ground
20	NC	none
21	NC	none
22	NC	none
23	NC	none
24	Polarity Status POS/NEG	TTL “1” indicates positive output, TTL “0” indicates negative output
25	NC	none

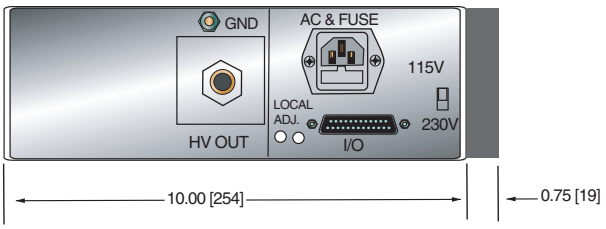
The ”/” in front of a parameter indicates the function is active when low.

DIMENSIONS: in.[mm]

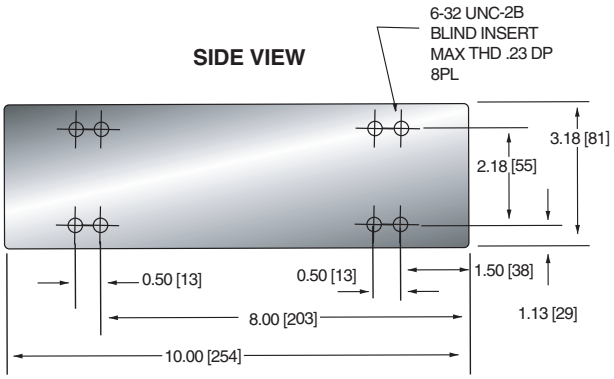
BOTTOM VIEW



FRONT VIEW



SIDE VIEW



- ***MODULAR BENCH TOP DESIGN***
- ***115/220 VAC SWITCHABLE***
- ***DIFFERENTIAL INPUT PROGRAMMING***

Spellman's Bertan brand of 835 Series high voltage power supplies provide well-regulated, fixed polarity outputs from 500 to 50kV that operate off a standard switch-selectable 115/230Vac input. The 835 Series is fully arc and short circuit protected. Excellent regulation specifications are featured along with outstanding stability performance.

TYPICAL APPLICATIONS

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

SPECIFICATIONS

Input Voltage:
90 - 135Vac, ±10%, 50/60 Hertz @ 6 amps
185 - 265Vac, ±10%, 50/60 Hertz @ 3 amps
Input voltage is switch selectable

Output Voltage:
See "model selection" table

Output Polarity:
Positive or negative, specify at time of order

Output Current:
See "model selection" table

Voltage Regulation:
Line: ±(0.01% of setting + 0.01% of maximum) for ±10% input line change.

Load: ±(0.02% of setting + 0.02% of maximum) for FL-NL and NL-FL change.

Current Regulation:
Line: ±(0.05% of setting + 0.05% of maximum) for ±10% input line change.rated full current.
Load: ±(0.1% of setting + 0.1% of maximum) for 0 to maximum rated output voltage change.

Ripple:
0.1% of setting + 0.1% of maximum, peak-to-peak.

Temperature Coefficient:
Constant voltage operation:
±(50ppm of setting + 50ppm of maximum)/°C
Constant current operation:
±(100ppm of setting + 100ppm of maximum)/°C

Stability: (1/2 hour warm up)
Constant voltage operation:
±(0.01% of setting + 0.01% of maximum)/hr.; ±(0.02% of setting + 0.02% of maximum)/8 hrs.
Constant current operation: ±(0.02% of setting + 0.02% of maximum)/hr.; ±(0.04% of setting + 0.04% of maximum)/8 hrs.

Internal Controls:
Independent precision multi-turn potentiometers for voltage and current control. The resolution of each control is 0.05% of maximum. The potentiometers are screwdriver-adjustable and easily accessed.

Remote Programming:
Two independent 0 to 5Vdc inputs for 0 to maximum voltage and current outputs. Accuracy is ±(0.2% of setting + 0.2% of maximum). The programming input impedance is greater than 1MΩ. The program inputs are differential; this feature provides user-defined program voltage polarity and eliminates ground loops.

Voltage Monitor:
0 to +5Vdc proportional to 0 to maximum output high voltage. Accuracy is ±(0.2% of reading + 0.2% of maximum). The monitor output impedance is 10kΩ ±1%.

Current Monitor:
0 to +5Vdc proportional to 0 to maximum output current. Accuracy is ±(0.5% of reading + 0.2% of maximum). The monitor output impedance is 10kΩ ±1%.

Enable:
TTL compatible. Remote "high" signal disables high voltage, remote low enables high voltage. The enable input must be pulled low to allow operation of high voltage regardless of whether supply is in local or remote mode.

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:
25 pin "D" connector, a mating connector is provided

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MODULES

Output Connector:
A detachable 10 foot (3 meter) HV cable is provided.

Cooling:
Internal fan. Speed of fan is output power-dependent.

Dimensions
10.00˝ W X 5.00˝ H X 11.00˝ D
(254mm X 127mm X 279mm)

Weight:
13 pounds (8.8kg)

MODEL SELECTION TABLE

835 Series	Voltage	Current	Ripple
835-0.5N/P	0 to 500V	0 to 600mA	1V
835-1N/P	0 to 1kV	0 to 300mA	2V
835-1.5N/P	0 to 1.5kV	0 to 200mA	3V
835-3N/P	0 to 3kV	0 to 100mA	6V
835-5N/P	0 to 5kV	0 to 60mA	10V
835-10N/P	0 to 10kV	0 to 30mA	20V
835-20N/P	0 to 20kV	0 to 15mA	40V
835-30N/P	0 to 30kV	0 to 10mA	60V
835-50N/P	0 to 50kV	0 to 6mA	100V

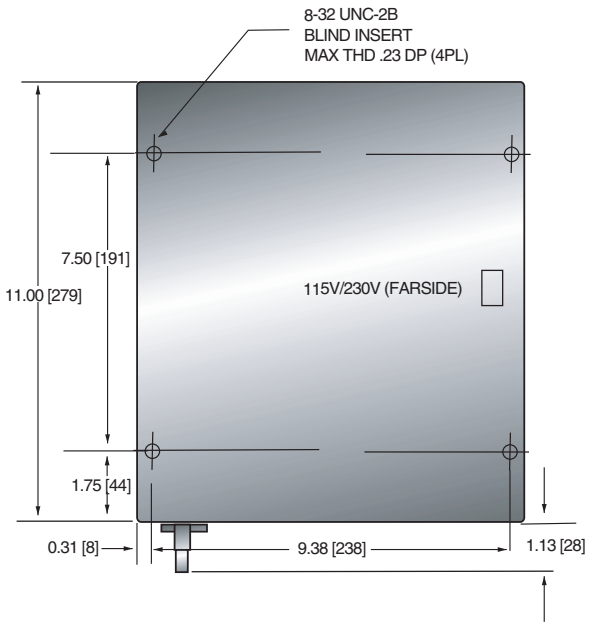
INTERFACE CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Vout Program Input (+)	0 to +5Vdc differential between pin 1 and pin 2 = 0 to 100% of rated Vout
2	Vout Program Input (-)	0 to +5Vdc differential between pin 1 and pin 2 = 0 to 100% of rated Vout
3	Vout Program Output	0 to +5Vdc = 0 to 100% rated voltage
4	Vout Monitor	0 to +5Vdc = 0 to 100% rated voltage, Zout =10kΩ
5	Common (Vmon & Vref Return)	Ground
6	Vreference Output	+5.0VDC @ 10mA, maximum
7	NC	none
8	NC	none
9	NC	none
10	Logic Common	Ground
11	/Enable Input	TTL “0” enables high voltage output, defaults to disabled status if left unconnected
12	Remote/Enable Output	TTL “1” indicates high voltage is enable, TTL “0” indicates high voltage is disabled
13	V Mode and I/Mode Output	TTL “1” indicates voltage mode operation, TTL “0” indicates current mode operation,
14	Iout Program Input (+)	0 to +5Vdc differential between pin 14 and pin 15 = 0 to 100% of rated Iout
15	Iout Program Input (-)	0 to +5Vdc differential between pin 14 and pin 15 = 0 to 100% of rated Iout
16	Iout Program Output	0 to +5Vdc differential = 0 to 100% of rated current
17	Iout Monitor	0 to +5Vdc = 0 to 100% rated voltage, Zout =10kΩ
18	Iout Common (Iout Monitor Return)	Ground
19	Analog Common	Ground
20	NC	none
21	NC	none
22	NC	none
23	NC	none
24	Polarity Status POS/NEG	TTL “1” indicates positive output, TTL “0” indicates negative output
25	NC	none

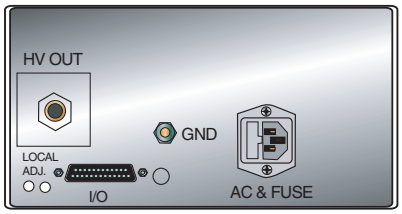
The "/" in front of a parameter indicates the function is active when low.

DIMENSIONS: in.[mm]

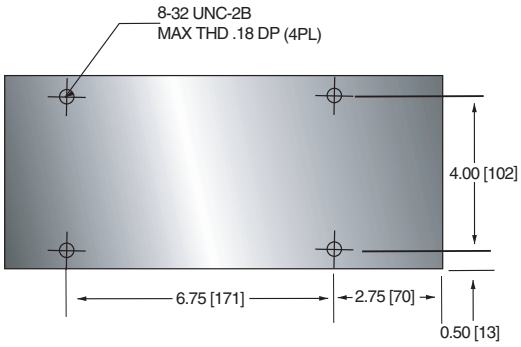
BOTTOM VIEW



FRONT VIEW



SIDE VIEW



89/336/EEC
73/23/EEC
E242584
Up to 5kV only

- ***COMPACT & LIGHTWEIGHT***
- ***MODELS FROM 1KV-70KV, 300W-600W***
- ***UNIVERSAL INPUT, POWER FACTOR CORRECTED***
- ***LOW COST MODULAR DESIGN***
- ***STANDARD DIGITAL INTERFACES: USB, ETHERNET AND RS-232***

Spellman's SLM Series of high voltage modules are designed for OEM applications up to 70kV at 600 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 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:
2 power ranges available—300 watts and 600 watts

Voltage Regulation:
≤0.01% of rated output voltage over specified input voltage range
≤0.01% of rated output voltage for a full load change

Current Regulation:
≤0.01% of rated output current over specified input voltage range
≤0.01% of rated output current for a ±100µA for a full voltage change

Ripple:
≤0.2% rms of maximum rated voltage, measured with a 10 foot long HV cable

Stability:
≤50ppm/hr after a 2 hour warm up

Temperature Coefficient:
≤100ppm 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 RS232 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:
4.75˝ H X 6˝ W X 12˝ D (120.65mm x 152.4mm x 304.8mm)

Weight:
14 pounds (5.44kg)

Input Line Connector:
IEC320 cord set with integrated EMI filter

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

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SLM SELECTION TABLE- 300W, 600W

300 Watt			600 Watt	
kV	mA	Model	mA	Model
1	300	SLM1*300	600	SLM1*600
3	100	SLM3*300	200	SLM3*600
5	60	SLM5*300	120	SLM5*600
10	30	SLM10*300	60	SLM10*600
15	20	SLM15*300	40	SLM15*600
20	15	SLM20*300	30	SLM20*600
30	10	SLM30*300	20	SLM30*600
40	7.5	SLM40*300	15	SLM40*600
50	6	SLM50*300	12	SLM50*600
60	5	SLM60*300	10	SLM60*600
70	4.28	SLM70*300	8.56	SLM70*600

*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, 50V @ 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, 50V @10mA Maximum
15	Spare	No Connection

RS-232 DIGITAL INTERFACE— J3 9 PIN MALE 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

89/336/EEC
73/23/EEC

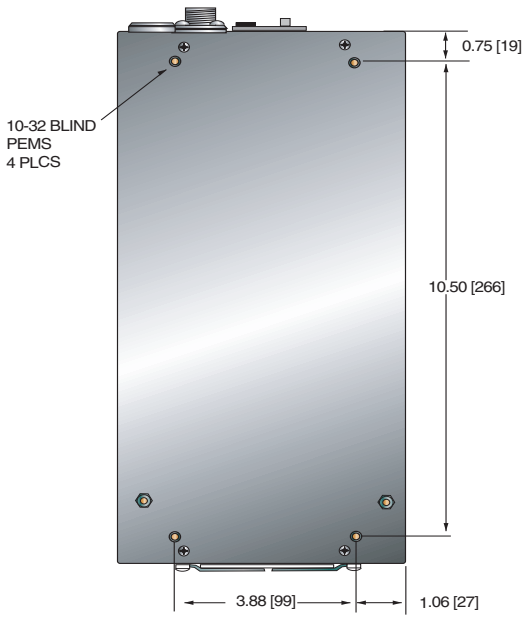
E227588

ETHERNET DIGITAL INTERFACE— J5 8 PIN RJ45 CONNECTOR

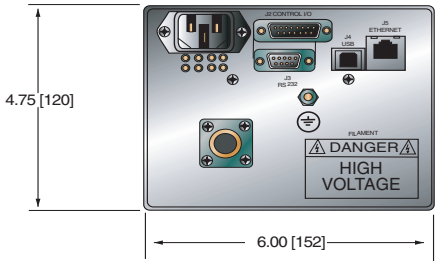
PIN	SIGNAL	SIGNAL PARAMETERS
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	No Connection

DIMENSIONS: in.[mm]

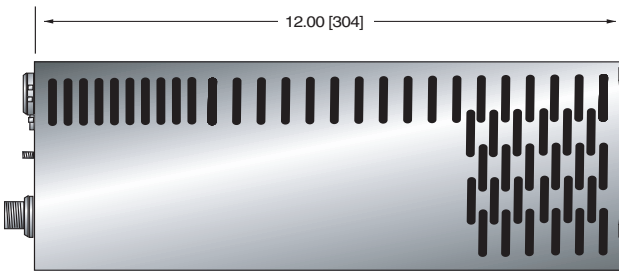
BOTTOM VIEW



FRONT VIEW



SIDE VIEW



SL 10W-300W

SL 600W-1200W

- ***VERY COMPACT AND LIGHTWEIGHT***
- ***LOW EMI AND RFI***
- ***VOLTAGE RANGE FROM 1KV TO 130KV***
- ***REVERSIBLE POLARITY STANDARD UP TO 6KV***
- ***SYSTEM STATUS INDICATORS***
- ***EXTENSIVE ANALOG AND DIGITAL INTERFACE***
- ***ARC QUENCH/ARC COUNT/ARC TRIP***
- ***OEM CUSTOMIZATION AVAILABLE***

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

OPTIONS

See page 4 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±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: ±0.005% of full voltage +500mV over specified input range

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.

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.

Output Cable:
10' (3.3m) 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: 1¾"H(1U) x 19"W x 19"D**
(4.45cm x 48.3cm x 48.3cm).
600W – 1200W: 3½"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.

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

1.75" (1U)

kV	10 Watt mA	10 Watt Model	30 Watt mA	30 Watt Model	60 Watt mA	60 Watt 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 mA	150 Watt Model	300 Watt mA	300 Watt 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

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

SL SELECTION TABLE- 600W, 1200W

3.50" (2U)

kV	600 Watt mA	600 Watt Model	1200 Watt mA	1200 Watt 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

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

SL TERMINAL BLOCK 26 PIN

TB1	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
13	Remote Power Program In	(Optional)
14	Local HV Off Out	+15V at Open, <25mA at Closed
15	HV Off	Comment 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	Spare	Spare
26	Shield Return	Chassis Ground

RACK MOUNTED

How To Order:

Sample model number: SL80PN1200/NSS/DPM4

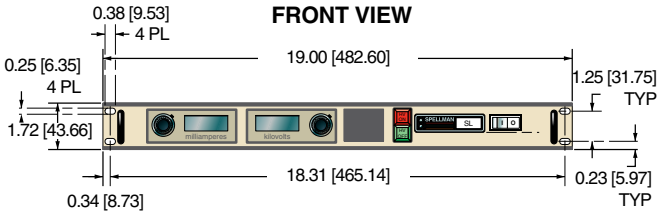
SL series unit, 80kV maximum output voltage, reversible polarity output, 1200 watts, no slow start, 4.5 digit panel meters

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

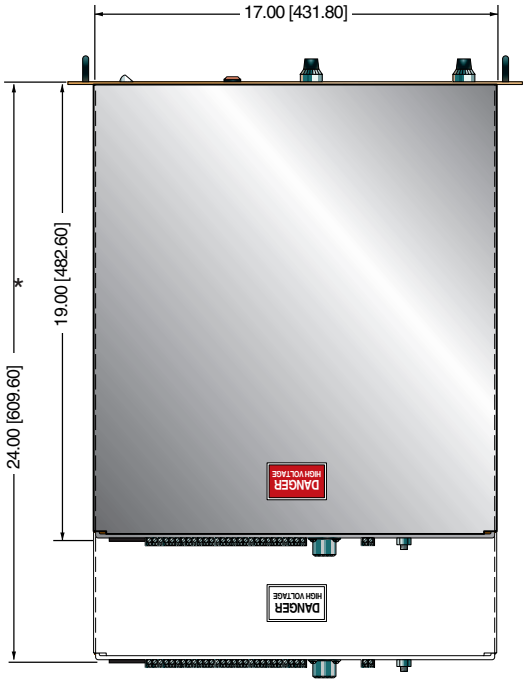
DIMENSIONS: in.[mm]

10W-300W

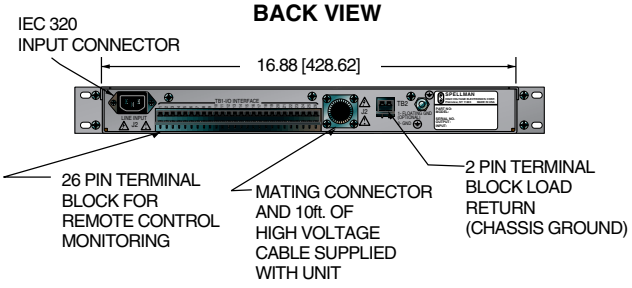
FRONT VIEW



TOP VIEW

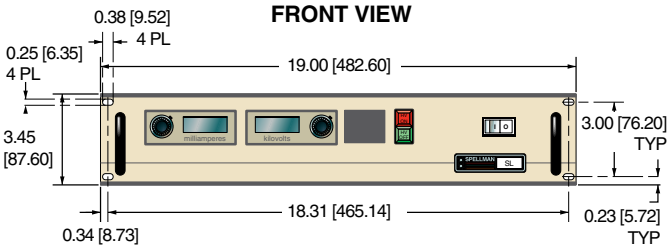


BACK VIEW

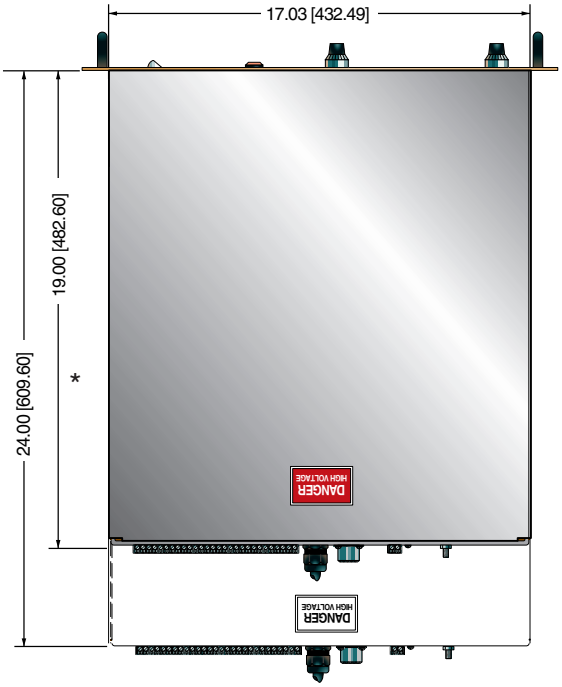


600W-1200W

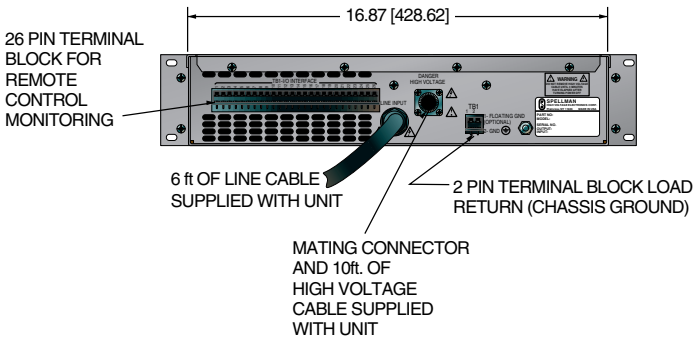
FRONT VIEW



TOP VIEW



BACK VIEW



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

CE
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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.

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/connecter 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.

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.

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.

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.

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.

CPC *Constant Power Control*
Identical to the ATP Option with the exception the power supply will run and regulate when the power loop becomes active.

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

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.

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.

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.

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.

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.

DPM4 *Digital Panel Meter, 4.5 digits*
The standard 3.5 digit front panel meters are replaced with 4.5 digit panel meters.

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).

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.

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.

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.

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

RACK MOUNTED

- ***1-50KV @ 15-30 WATTS***
- ***STANDARD RACK MOUNTED DESIGN***
- ***LOW RIPPLE AND NOISE***
- ***DIGITAL METERING***
- ***REVERSIBLE OUTPUT POLARITY***

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 30 watt 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

SPECIFICATIONS

Input Voltage:
115Vac, ±10%, 50/60 Hertz @ 1 amp
230Vac, ±10%, 50/60 Hertz @ 0.5 amps
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: ≤50ppm/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

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 connecter, 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:
≤20 pounds (9.1kg) up to and including 20kV units,
≤35 pounds (15.9kg) for 30kV and 50kV units

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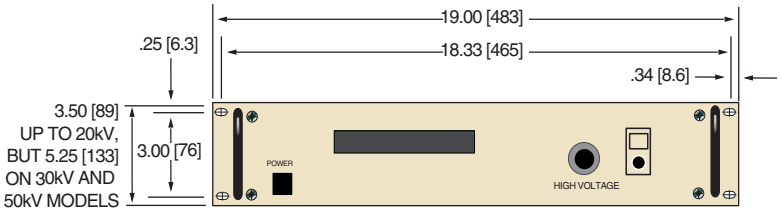
MODEL SELECTION TABLE

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	2 volts

DIMENSIONS: in.[mm]

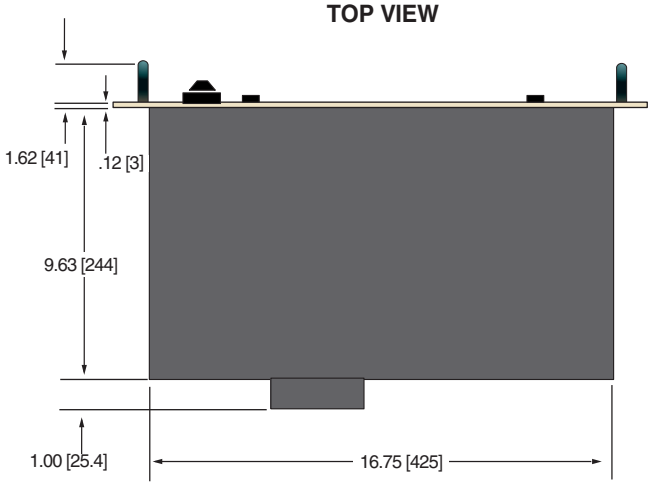
FRONT VIEW



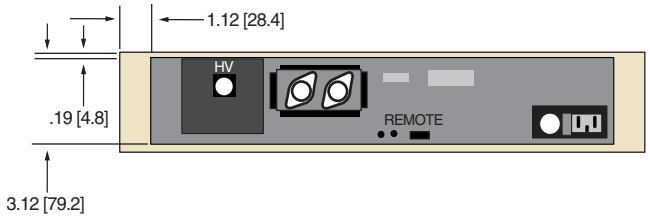
INTERFACE CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
2	n/c	none
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

TOP VIEW



BACK VIEW



89/336/EEC
73/23/EEC

RACK MOUNTED

- ***STANDARD RACK MOUNTED DESIGN***
- ***LOW RIPPLE AND NOISE***
- ***5.5 DIGIT FRONT PANEL DIGITAL METERING***
- ***REVERSIBLE OUTPUT POLARITY***
- ***IEEE-488 INTERFACE***

Spellman's Bertan brand of 225 Series high voltage power supplies provide regulated high voltage outputs from 500V to 50kV. An advanced IEEE-488 digital interface, allowing comprehensive power supply control capability is included. The low noise, linear topology employed results in extremely low output ripple specifications. These 15 to 30 watt units are inherently reversible by design, providing either positive or negative output polarity. The 225 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%, 50/60 Hertz @ 2 amps
230Vac, ±10%, 50/60 Hertz @ 1 amp
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: ≤0.001% 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

Front Panel Metering and Controls:
5.5 digit metering for voltage and current
Power ON/OFF switch
High Voltage ON/OFF switch
Velocity proportional digital potentiometer and pushbuttons for inputting operational parameters

IEEE-488 Interface:
Controllable parameters:
Voltage program, voltage limit, current limit, overload response mode and SRQ mode

Reportable Parameters:
Voltage monitor, current monitor, limit settings, mode settings, polarity and status information

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

GPIB Connector:
IEEE-488

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:
≤20 pounds (9.1kg) up to and including 20kV units,
≤35 pounds (15.9kg) for 30kV and 50kV units

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MODEL SELECTION TABLE

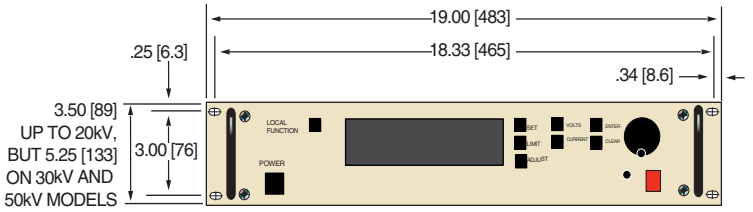
225 Series	Voltage	Current	Ripple	Voltage Resolution	Current Resolution
225-0.5R	0 to 500V	0 to 60mA	10mV	100mV	1uA
225-01R	0 to1kV	0 to 30mA	10mV	100mV	1uA
225-03R	0 to 3kV	0 to 10mA	30mV	100mV	1uA
225-05R	0 to 5kV	0 to 5mA	50mV	100mV	0.1uA
225-10R	0 to 10kV	0 to 2.5mA	100mV	1 volt	0.1uA
225-20R	0 to 20kV	0 to 1mA	300mV	1 volt	0.1uA
225-30R	0 to 30kV	0 to 0.5mA	400mV	1 volt	0.01uA
225-50R	0 to 50kV	0 to 0.3mA	2 volts	1 volt	0.01uA

INTERFACE CONNECTOR

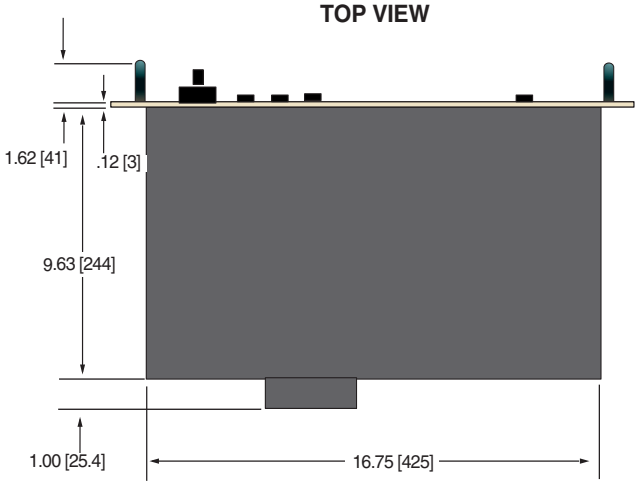
PIN	SIGNAL	PARAMETERS
1	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
2	n/c	none
3	Enable	TTL "0" disables HV, TTL "1" or open enables HV
4	+5Vdc Reference	+5.0Vdc @ 10mA, maximum
5	Current Monitor	0 to 5Vdc = 0 to 100% rated current, Zout = 10KΩ
6	Voltage Program Input	0 to 5Vdc = 0 to 100% rated voltage, Zin = 1MΩ
7	Analog Ground	Ground
8	Digital Ground	Ground
9	Polarity Indicator	Open collector, 30V @ 25mA, positive = ON

DIMENSIONS: in.[mm]

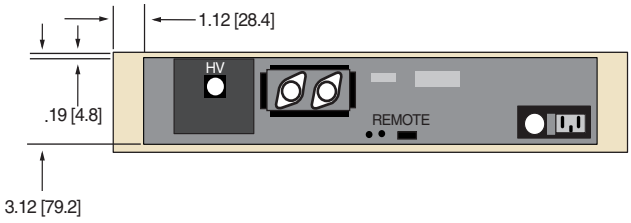
FRONT VIEW



TOP VIEW



BACK VIEW



RACK MOUNTED

89/336/EEC
73/23/EEC

- ***STANDARD RACK MOUNTED DESIGN***
- ***LOW RIPPLE AND NOISE***
- ***REVERSIBLE OUTPUT POLARITY***

Spellman's Bertan brand of 210 Series of 125 to 225 watt 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%, 50/60 Hertz @ 5 amps
230Vac, ±10%, 50/60 Hertz @ 2.5 amps
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

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

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MODEL SELECTION TABLE

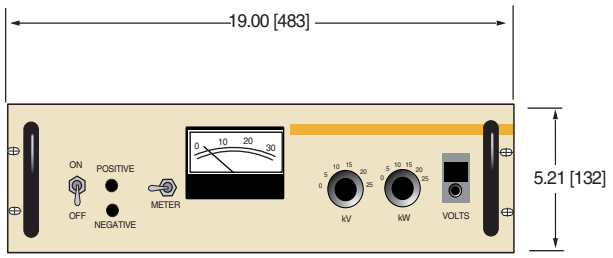
210 Series	Voltage	Current	Ripple
210-01R	0 to 1kV	0 to 225mA	50mV
210-1.5R	0 to 1.5kV	0 to 130mA	100mV
210-02R	0 to 2kV	0 to 100mA	100mV
210-03R	0 to 3kV	0 to 75mA	100mV
210-05R	0 to 5kV	0 to 40mA	200mV
210-10R	0 to 10kV	0 to 15mA	500mV
210-20R	0 to 20kV	0 to 7mA	1 volt
210-30R	0 to 30kV	0 to 4.5mA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

INTERFACE CONNECTOR

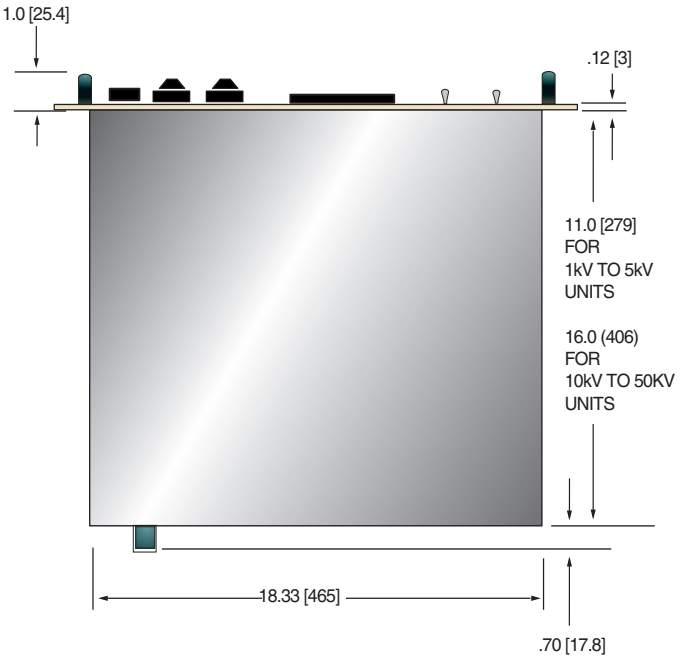
PIN	SIGNAL	PARAMETERS
A	-5Vdc Reference	-5.0Vdc @ 5mA, maximum
B	Voltage Program Input	0 to -5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
C	Analog Ground	Ground
D	Current Monitor	0 to 5Vdc = 0 to 100% rated current, Zout = 10KΩ
E	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
F	Polarity Indicator	Open collector output, ON = Positive Polarity
G	n/c	none

DIMENSIONS: in.[mm]

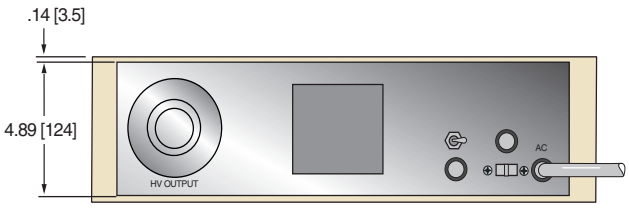
FRONT VIEW



TOP VIEW



BACK VIEW



89/336/EEC
73/23/EEC

RACK MOUNTED

SL150kV 1200W POWER SUPPLY

- ***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***

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)

SPECIFICATIONS

Front Panel Controls:
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

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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

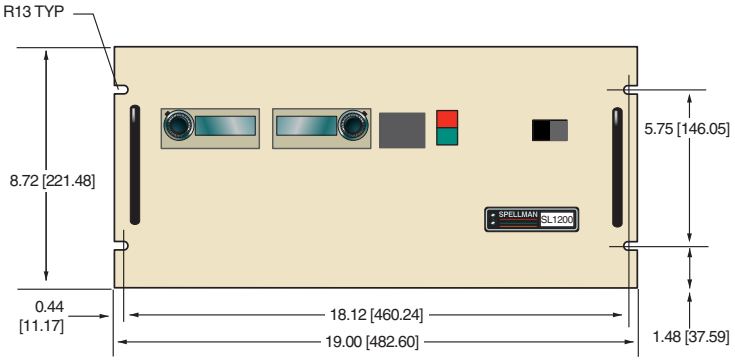
Cooling:
Forced Air

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)

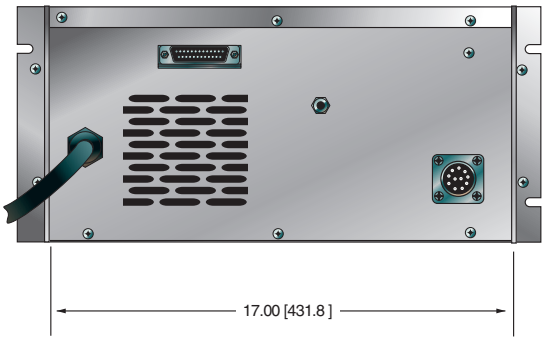
DIMENSIONS: in.[mm]

FRONT VIEW



TOP VIEW

BACK VIEW



SL150 ANALOG INTERFACE— J1 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, ≤ 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 =10kΩ
6	Voltage Monitor	0 to 10Vdc = 0 to 100% rated voltage, Zout =10kΩ
7	+10Vdc Reference	+10Vdc @ 1mA, maximum
8	Remote Current Program Input	0 to 10Vdc = 0 to 100% rated voltage, Zout =10kΩ
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 =10kΩ
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	Spare	NC

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.

RACK MOUNTED

- ***160KV - 360KV OUTPUTS***
- ***LOW RIPPLE***
- ***HIGH STABILITY***
- ***OVERCURRENT, OVERVOLTAGE AND ARC PROTECTION***
- ***ARC DETECT***
- ***LIGHTWEIGHT, COMPACT SIZE***
- ***OEM CUSTOMIZATION AVAILABLE***

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
Electron Guns
Particle Accelerators

SPECIFICATIONS

Input Voltage:
220Vac±10%, three phase, 50/60Hz. (200Vac±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.

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:
Overcurrent, 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:
Depends on model specified.

Distance from Stack to Driver:
2.5 meters ±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	Overcurrent
Current Control Mode	Overvoltage
Interlock Open	Arc
Interlock Closed	Regulation Error
High Voltage Inhibit	Overtemperature
Overpower (optional)	

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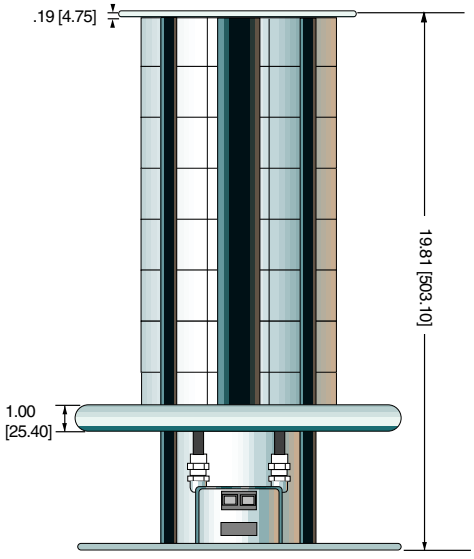
SLS SELECTION TABLE

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

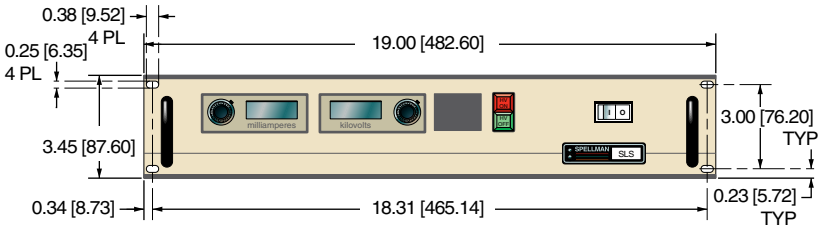
J3	SIGNAL
1	Power Supply Common
2	External Inhibit
3	External Interlock
4	External Interlock Return
5	Current Monitor
6	Voltage Monitor
7	+10V Reference
8	Remote Current Program In
9	Local Current Program Out
10	Remote Voltage Program In
11	Local Voltage Program Out
12	EFR (common)
13	EFR (normally closed)
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



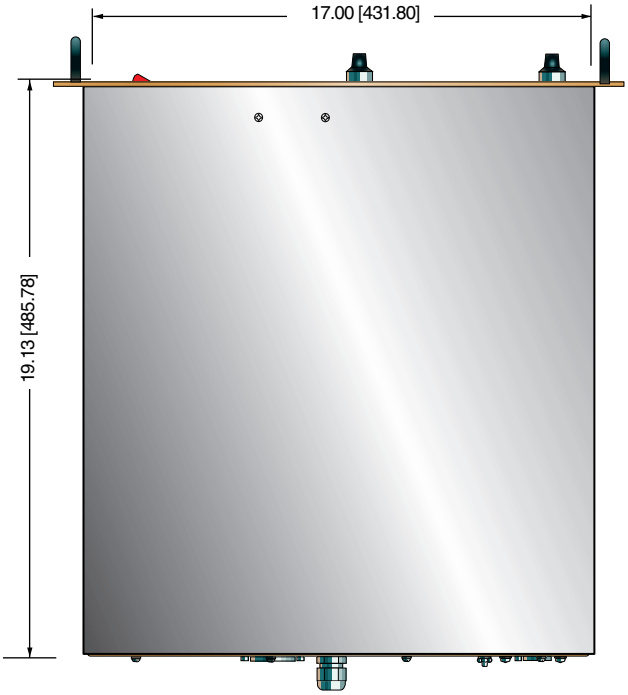
160kV Model

DIMENSIONS: in.[mm]

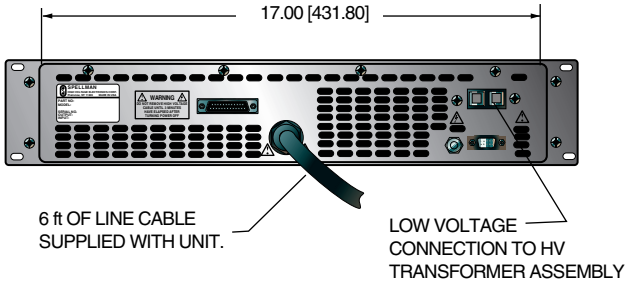
FRONT VIEW



TOP VIEW



BACK VIEW



CE
89/336/EEC
73/23/EEC

RACK MOUNTED

- ***COMPACT DESIGN AND LIGHTWEIGHT***
- ***LOW COST PER WATT***
- ***LOW EMI AND RFI***
- ***CONSTANT VOLTAGE/CONSTANT CURRENT OPERATION WITH AUTOMATIC CROSSOVER***
- ***ARC DETECT, ARC QUENCH AND ARC COUNT***
- ***SYSTEM STATUS INDICATORS***
- ***OEM CUSTOMIZATION AVAILABLE***

SA4 power supplies are available in 13 models with voltage outputs ranging from 1kV to 70kV. Similar to the SR6 power supplies, they incorporate series resonant inverter technology with a patented control circuit. This enables the supplies to operate without damage or interruption in rugged environments that frequently pose threats to conventional high voltage power supplies. In addition, the SA4 Series protect your load from excessive peak current when an arcover condition is sensed. Parallel operation options to increase power and current capabilities are available for SA4 models with power outputs of 8kW, 12kW and higher.

TYPICAL APPLICATIONS

Sputtering	CW Lasers
Analytical X-ray	Ion Implantation
Electron Beam Systems	Capacitor Charging
Radar Modulators	

OPTIONS

200-1P	200Vac Single Phase Input
200-3P	200Vac Three Phase Input
220-1P	220Vac Single Phase Input
AOL	Adjustable Overload Trip
FG	Floating Ground
CPC	Constant Power Control
APT	Adjustable Power Trip
RMI	Remote Mode Indicators
ROA	Remote Overvoltage Adjust
NSS	No Slow Start
SS(x)	Nonstandard Slow Start
SL	Mounting Slides
BFP	Blank Front Panel

SPECIFICATIONS

Input:
208Vac±10%, 50 or 60Hz, three phase.

Output:
13 models from 1kV to 70kV. Each model is available with positive, negative or reversible polarity outputs.

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

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

Current Regulation:
Load: 0.05% of full current ±100µA for any voltage change.
Line: ±0.05% of full current over specified input range.

Ripple:
0.1% +1Vrms for three phase models only.
0.3% +1Vrms for single phase models only.

Temperature Coefficient:
100ppm/°C. Higher Stability (50ppm/°C) available on special order.

Stability:
0.01%hr. after 1/2 hour warm-up, 0.02% per 8 hrs. (typical).

Metering:
Digital voltage and current meters, 1% accuracy.

System Status Display:
"Dead Front" type indicators provide status of up to 14 system operations including voltage and current regulation, fault conditions and circuit control.

Output Cable:
10 ft. (3.05m) shielded high voltage cable, removable at rear panel.

CE Mark:

Single Phase Input Models Only:
Compliant to European EMC 89/336/EEC and LV 73/23/EEC directives.

Dimensions:
5¼"H (3U) x 19"W x 22"D rack mount.
(13.3cm x 48.3cm x 55.9cm)

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SA4 SELECTION TABLE

MAXIMUM RATING kV	MAXIMUM RATING mA	MODEL NUMBER
1	4000	SA1PN4
2	2000	SA2PN4
3	1330	SA3PN4
4	1000	SA4PN4
6	667	SA6PN4
10	400	SA10*4
15	267	SA15*4
20	200	SA20*4
30	133	SA30*4
40	100	SA40*4
50	80	SA50*4
60	67	SA60*4
70	57	SA70*4

*Specify “P” for positive, “N” for negative, or “PN” for reversible polarity. Higher voltage or intermediate voltage models available on special order. From 1kV to 6kV, reversible polarity is accomplished by an internal wiring change. From 10kV to 70kV, polarity is reversed by exchanging internal high voltage assemblies.

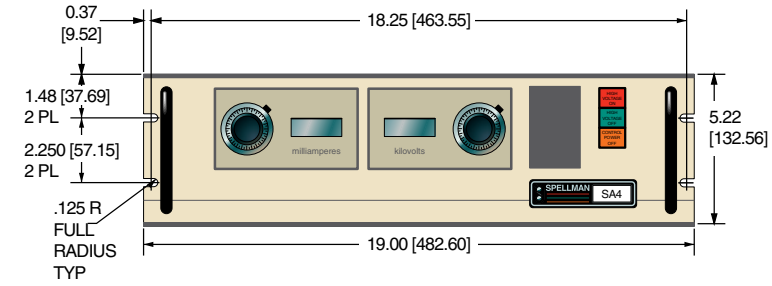
SA4 TERMINAL BLOCK 18 PIN

TB1	SIGNAL
1	P.S. Common
2	Inhibit
3	External Interlock In
4	External Interlock Out
5	mA Test point Out
6	kV Test point Out
7	+10Vdc Reference
8	mA Program In
9	Local mA Program Out
10	kV Program In
11	Local kV Program Out
12	Remote Pwr On In
13	Remote Pwr On Out
14	Remote HV Off
15	Remote HV Off/On Common
16	Remote HV On
17	HV Off Indicator
18	HV On Indicator

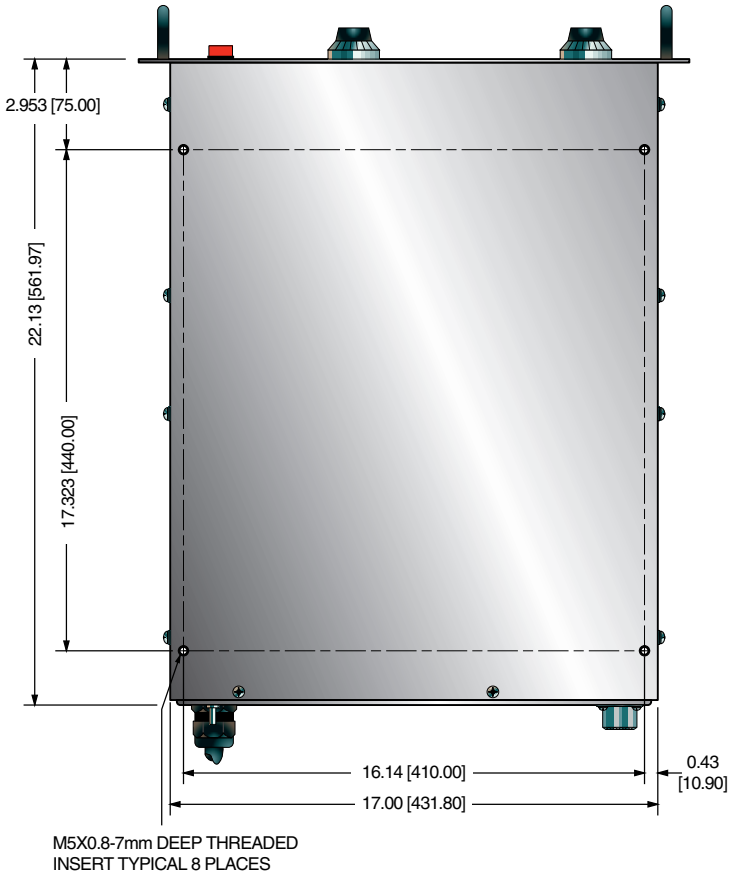
CE 89/336/EEC 73/23/EEC

DIMENSIONS: in.[mm]

FRONT VIEW

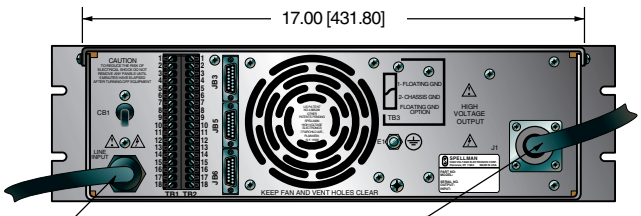


TOP VIEW



M5X0.8-7mm DEEP THREADED
INSERT TYPICAL 8 PLACES

BACK VIEW



6 ft OF LINE CABLE
SUPPLIED WITH UNIT.

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

RACK MOUNTED

- ***COMPACT DESIGN AND LIGHTWEIGHT***
- ***LOW COST PER WATT***
- ***LOW EMI AND RFI***
- ***CONSTANT VOLTAGE/CONSTANT CURRENT OPERATION WITH AUTOMATIC CROSSOVER***
- ***ARC DETECT, ARC QUENCH AND ARC COUNT***
- ***OEM CUSTOMIZATION AVAILABLE***

SR6 power supplies are available in 18 models with voltage outputs ranging from 1kV to 120kV. Similar to the SA4 power supplies, they incorporate series resonant inverter technology with a patented control circuit. This enables the supplies to operate without damage or interruption in rugged environments that frequently pose threats to conventional high voltage power supplies. In addition, the SR6 Series protects your load from excessive peak currents by instantaneously limiting the output current when an arcover condition is sensed. Parallel operation options to increase power and current capabilities are available for SR6 models with power outputs of 12kW, 18kW and higher.

TYPICAL APPLICATIONS

Sputtering
Analytical X-ray
Electron Beam Systems
Radar Modulators
CW Lasers
Ion Implantation
Capacitor Charging

OPTIONS

200-1P	200Vac Single Phase Input
200-3P	200Vac Three Phase Input
220-1P	220Vac Single Phase Input
AOL	Adjustable Overload Trip
FG	Floating Ground
CPC	Constant Power Control
APT	Adjustable Power Trip
RMI	Remote Mode Indicators
ROA	Remote Overvoltage Adjust
NSS	No Slow Start
SS(x)	Nonstandard Slow Start
SL	Mounting Slides
BFP	Blank Front Panel

SPECIFICATIONS

Input:
208Vac±10%, 50 or 60Hz, three phase.

Output:
18 models from 1kV to 120kV. Each model is available with positive, negative or reversible polarity outputs.

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

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

Current Regulation:
Load: 0.05% of full current ±100µA for any voltage change.
Line: ±0.05% of full current over specified input range.

Ripple:
0.1% p-p +1Vrms for three phase models only.
0.1% +1Vrms for single phase models only.

Temperature Coefficient:
100ppm/°C. Higher Stability (50ppm/°C) available on special order.

Stability:
0.01%hr. after 1/2 hour warm-up, 0.02% per 8 hrs. (typical).

Operating Temperature:
0°C to +40°C

Storage Temperature:
-40°C to +85°C

Humidity:
10% to 90% RH, non-condensing

Metering:
Digital voltage and current meters, 1% accuracy.

System Status Display:
"Dead Front" type indicators provide status of up to 14 system operations including voltage and current regulation, fault conditions and circuit control.

Output Cable:
10 ft (3.05m) shielded high voltage cable, removable at rear panel.

CE Mark:
Single Phase Input Models Only:
Compliant to European EMC 89/336/EEC and LV 73/23/EEC directives.

Dimensions:
10½"(6U)H x 19"W x 19"D rack mount, 1kV to 70kV. (26.7cm x 48.3cm x 48.3cm)
10½"(6U)H x 19"W x 24"D rack mount, 80kV to 120kV. (26.7cm x 48.3cm x 61.0cm)

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RACK MOUNTED

SR6 SELECTION TABLE

MAXIMUM RATING		MODEL NUMBER
kV	mA	
1	6000	SR1PN6
2	3000	SR2PN6
3	2000	SR3PN6
6	1000	SR6PN6
8	750	SR8*6
10	600	SR10*6
12	500	SR12*6
15	400	SR15*6
20	300	SR20*6
30	200	SR30*6
40	150	SR40*6
50	120	SR50*6
60	100	SR60*6
70	85	SR70*6
80	75	SR80*6
100	60	SR100*6
110	55	SR110*6
120	50	SR120*6

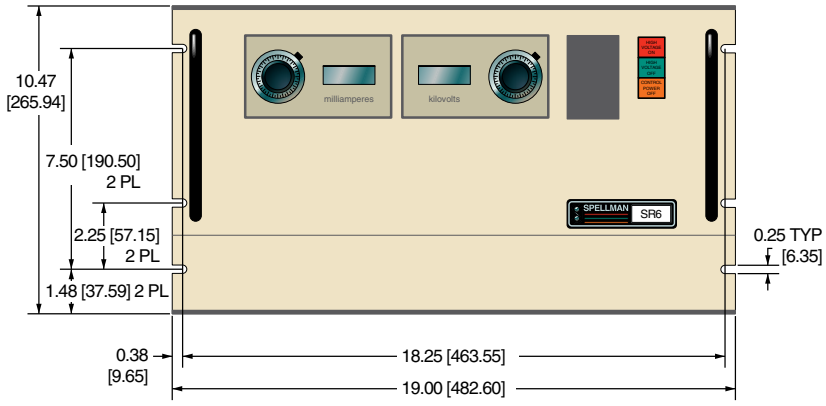
*Specify "P" for positive, "N" for negative, or "PN" for reversible polarity. Higher voltage or intermediate voltage models available on special order. From 1kV to 6kV, reversible polarity is accomplished by changing a rear panel link. From 8kV to 120kV, polarity is reversed by exchanging internal high voltage assemblies.

SR6 TERMINAL BLOCK 18 PIN

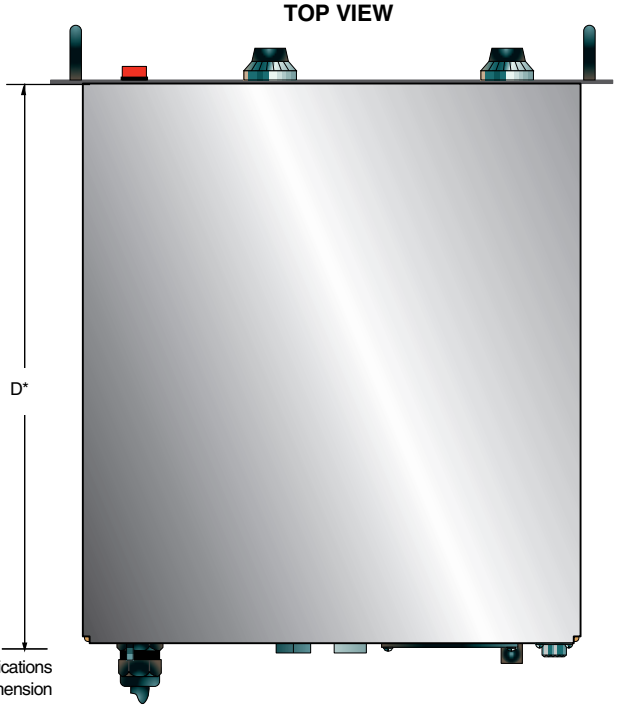
TB1	SIGNAL
1	P.S. Common
2	Inhibit
3	External Interlock In
4	External Interlock Out
5	mA Test point Out
6	kV Test point Out
7	+10Vdc Reference
8	mA Program In
9	Local mA Program Out
10	kV Program In
11	Local kV Program Out
12	Remote Pwr On In
13	Remote Pwr On Out
14	Remote HV Off
15	Remote HV Off/On Common
16	Remote HV On
17	HV Off Indicator
18	HV On Indicator

DIMENSIONS: in.[mm]

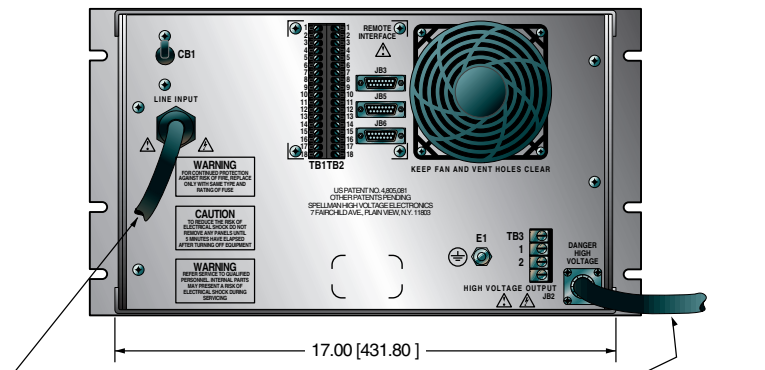
FRONT VIEW

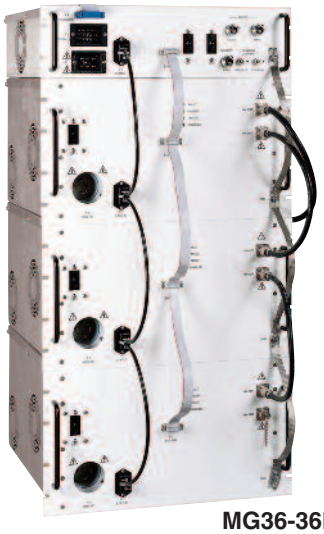


TOP VIEW



BACK VIEW





- ***CURRENT OUTPUT SOURCE***
- ***LOW STORED ENERGY***
- ***FAST FAULT SHUTDOWN (<30µSEC)***
- ***PROVISION TO LIMIT MICROWAVE REFLECTED POWER***
- ***PROGRAMMABLE FILAMENT SUPPLY***
- ***OVERVOLTAGE, OVERCURRENT, ARC, AND SHORT CIRCUIT PROTECTION***
- ***LOW COST***
- ***LIGHTWEIGHT***
- ***OEM CUSTOMIZATION AVAILABLE***

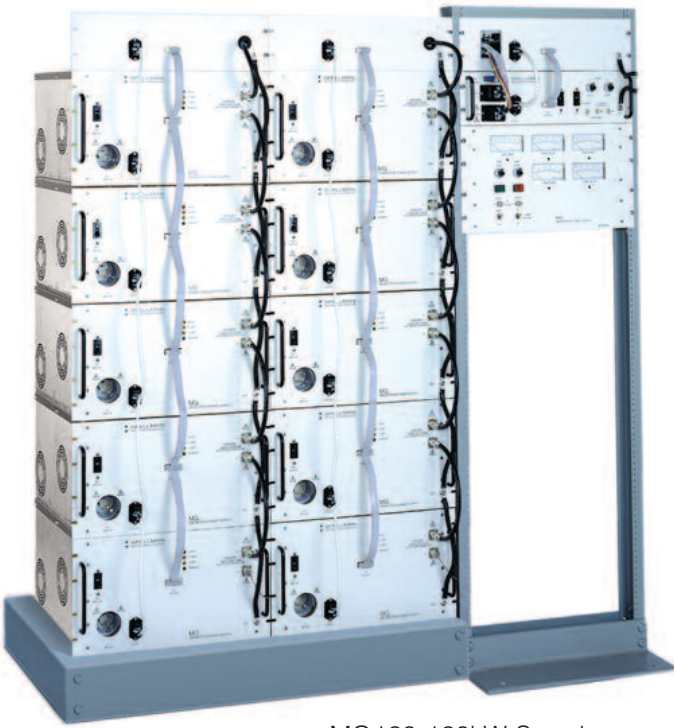
MG36-36kW Supply

MG10/MG12-10kW/12kW Supply

Spellman's MG Series of magnetron HV power supplies are rugged, high frequency, high efficiency units designed specifically to power CW magnetrons ranging from 10kW to 120kW. They contain filament and optional magnet control supplies to provide a complete drive system.

TYPICAL APPLICATIONS

Industrial Cooking
Powder Drying
Rubber Vulcanization
Sintering of Ceramics
Processing of Radioactive Waste
Plasma Generation



MG120-120kW Supply

SPECIFICATIONS

Input:
480Vac±10%, 3 phase, 50/60Hz. 400Vac and 440Vac optional. Specify with order.

Output Voltage:
See Table.

Output Current:
See Table.

Output Power:
See Table.

Voltage Regulation:
Load: 0.5% for 0 to 100% change in output current.
Line: ±0.1% for ±10% change in line voltage.

Current Regulation:
Load: 0.5% of rated current for any voltage change.
Line: ±0.1% of rated current over the specified input range.

Current Ripple: 5% rms.
Lower ripple available on special order.

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

Front Panel Metering:
Voltage and current meters optional.

Voltage and Current Programming:
10V = full output, Z in ≥1 megohm

Voltage Monitor:
0 to 10V = 0 to full output kV, Z out = 1Kohm.

Current Monitor:
0 to 10V = 0 to full output current, Z out = 1Kohm.

Filament Supply:
The power supply provides a regulated filament current at the secondary of an external filament isolation transformer supplied with each unit.

Magnet Power Supply:
See Table.

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CHINA +86 (0)512-67630010 FAX: +86 (0)512-67630030
e-mail: sales@spellmanhv.com
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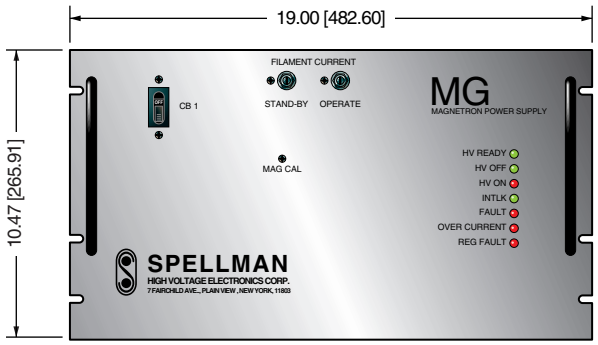
MG SELECTION TABLE

	MODEL	MG10/MG12	MG36	MG72	MG120
RF Power max	kW	6/8.5	20	60	100
DC Power max	kW	10/12.5	36	72	120
V max	-kV	8	15	17	20
I max	A	1.25/1.7	2.5	5	6
V Fil Preheat	V	5	10	12.6	14
I Fil Preheat	A	33/52	50	115	115
Time Preheat	Sec	10	180	180	180
I Fil @ I max	A	0/40	20	86	74
I Magnet	A	3	5	5	5
V Magnet	V	16	50	50	50
Height	in(mm)	10.5 (26.7)	36.75(93.4)	72(183)	63(160)
Width & Depth	19" x 19" (48.26 x 48.26cm)				2 x
19"x19"					

DIMENSIONS: in.[mm]



Model MG10/MG12-10kW/12kW Supply

ANALOG CONTROL INTERFACE

P4	SIGNAL	P4	SIGNAL
1	Return	14	I Program
2	Return	15	I Anode Monitor
3	Return	16	V Cathode Monitor
4	Return	17	Magnet Program
5	Return	18	Magnet Monitor
6	Return	19	Filament Program
7	Return	20	I Filament Monitor
8	Return	21	Control Fault
9	Return	22	+10V Reference
10	Return	23	RF Arc
11	Spare	24	Spare
12	Spare	25	Spare
13	Spare		

DIGITAL INTERFACE & AUX. POWER

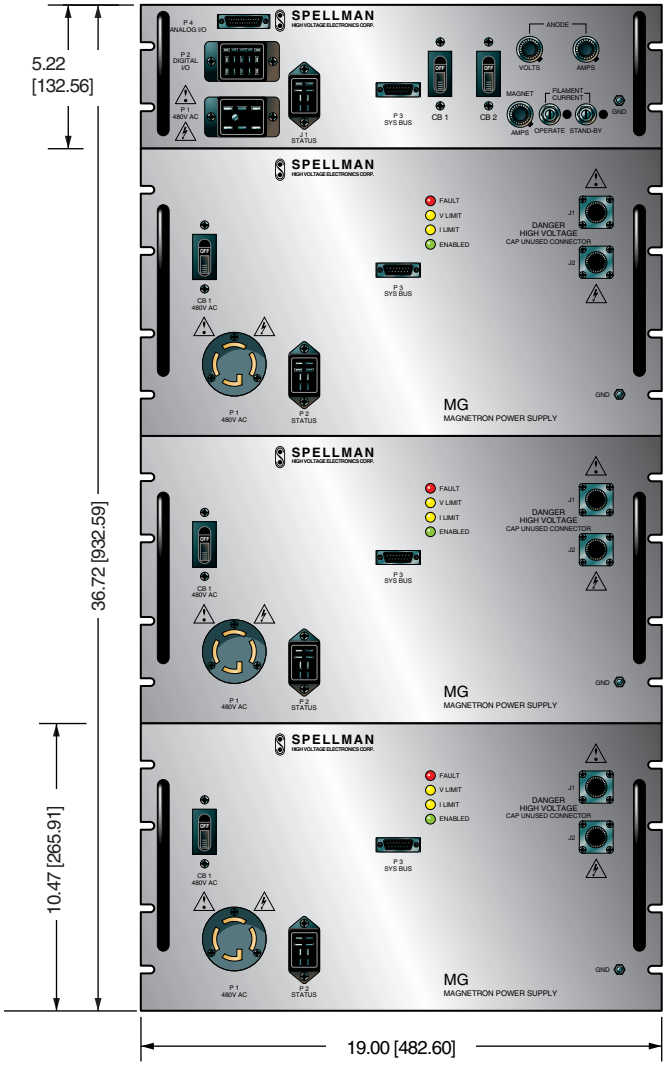
P2	SIGNAL	P2	SIGNAL
1	110Vac Input	9	Arc Detect
2	110Vac Return	10	Control Fault
3	HV Enable	11	Breakers Healthy
4	HV On	12	Temp Warning
5	Power On	13	Fault 1
6	Filament Warmup	14	Fault 2
7	Filament Ready	15	Fault 3
8	HV On Indicator		

POWER, FILAMENT & MAGNET CONNECTIONS

P1	SIGNAL	P1	SIGNAL
7	480Vac (Phase A)	10	Filament Out-A
8	480Vac (Phase B)	11	Mag. Output +
9	Filament Out-B	12	Mag. Output Rtn.

CE
89/336/EEC
73/23/EEC
Compliant Upon Customer Request

FRONT VIEW



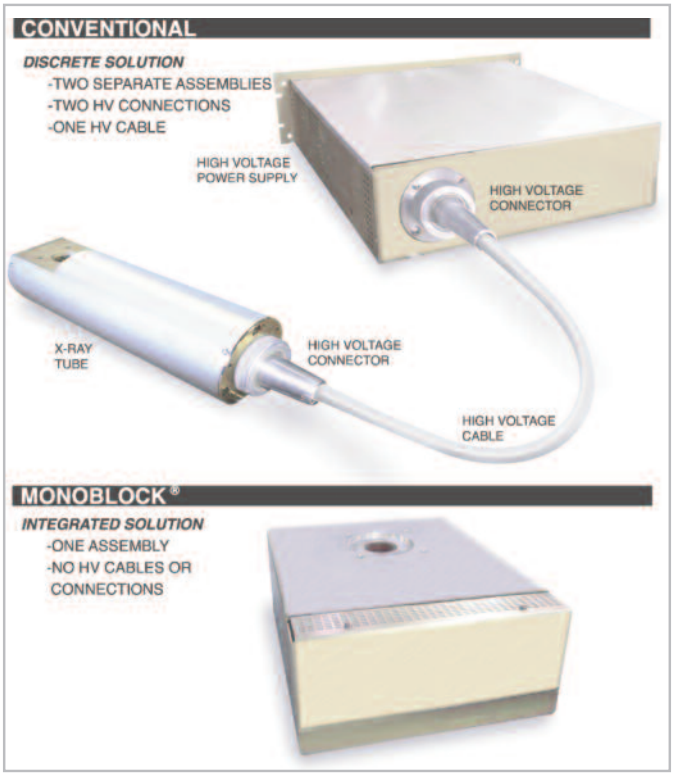
Model MG36-36kW Supply

RACK MOUNTED

- ***INCLUDES POWER SUPPLY & X-RAY TUBE IN AN INTEGRATED SUBSYSTEM***
- ***TUBE SELECTION PER OEM REQUIREMENTS***
- ***FLEXIBLE MECHANICAL CONFIGURATION***
- ***FULL REMOTE CONTROL OF KV & EMISSION CURRENT***
- ***LINEAR RANGE OF KV & MA***
- ***HIGH STABILITY***

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

A Monoblock® is typically a single assembly housing both high voltage generation components and an X-Ray tube. The physical compactness and inherent elimination of cabling, reduces cost and the risk of breakdown, thus making these products extremely reliable. Monoblock® can be designed in a wide variety of geometries, with beam shape, focal spot size and other critical parameters customized for the application. Digital control via RS232, Ethernet or USB is available.



TYPICAL APPLICATIONS

Security/EDS
Food/Fill Level Inspection
CT-Medical
NDT
Bone Densitometry

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TYPICAL SPECIFICATIONS

X-Ray Tube Models:
A wide variety of X-Ray tubes from all major tube vendors

Beam Parameters:
Cone beam: up to 40°
Fan beam: up to 110° x 10°

Target Angle:
12° to 45°

Focal Spot:
35 micron to 3mm x 3mm

KV Range:
10kV to 200kV

Emission Current Range:
Up to 10mA

Duty Cycle:
Pulse and Continuous mode

Line Regulation (KV):
0.1%

Line Regulation:
(Emission Current) 0.1%

Load Regulation (KV):
0.1%

Load Regulation:
(Emission Current) 0.1%

Ripple:
0.2% to 1%

Temperature Stability:
25ppm to 200ppm

Rise Time:
100mSec to 1 minute

Regulatory and Safety Standards:
UL, CSA, VDE to EN60601, EN60950, EN61010

Mechanical:
Each monoblock is developed per custom OEM requirements.

Insulation Media:
Oil and Solid encapsulation

Operating Temperature:
0°C to 50°C

Long Term Storage Temp:
-20°C to 70°C

Humidity, Operating and Storage:
10-95%, non-condensing

- ***OUTPUT VOLTAGES TO 130KV***
- ***INTEGRATED GROUND REFERENCED FILAMENT SUPPLY***
- ***LOW RIPPLE***
- ***"HOT ANODE"***
- ***POSITIVE POLARITY***
- ***LOCAL & REMOTE PROGRAMMING***
- ***OEM CUSTOMIZATION AVAILABLE***

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±10%, 50-60Hz single phase or
220Vac±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: ±1%. Input Impedance: 10Mohm.

Filament:
Specify at time of order:
FH: 9A, 3V.
FL: 3A, 3V.
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:
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).

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

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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.

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.

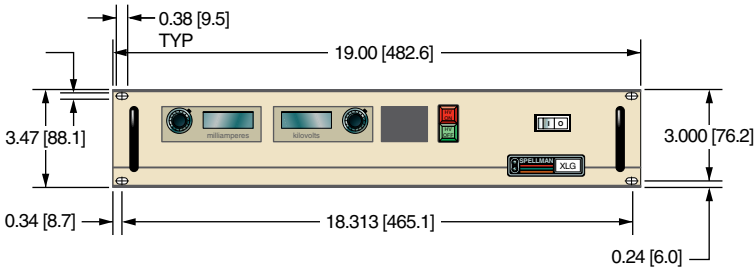
XLG CONNECTOR 25 PIN

JB1	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	
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

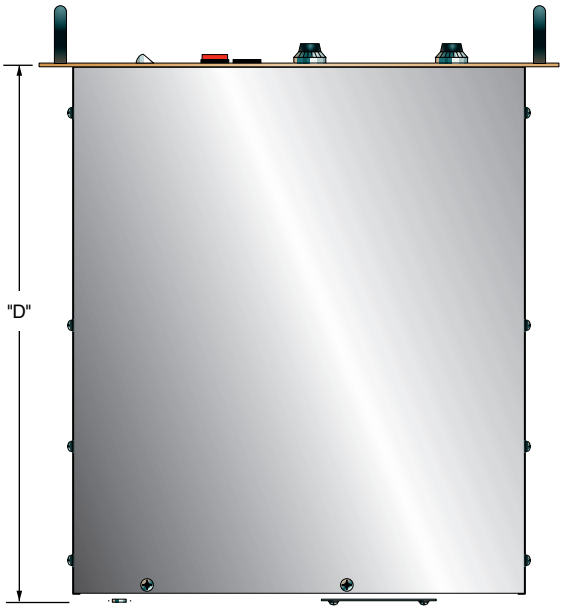
CE
89/336/EEC
73/23/EEC

DIMENSIONS: in.[mm]

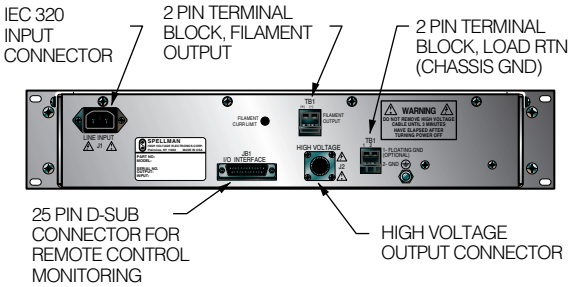
FRONT VIEW



TOP VIEW



BACK VIEW



X-RAY

- ***OUTPUT VOLTAGES FROM 25KV TO 65KV***
- ***ADJUSTABLE INTEGRATED FILAMENT SUPPLY***
- ***OVERVOLTAGE & SHORT CIRCUIT PROTECTION***
- ***VOLTAGE & CURRENT PROGRAMMING***
- ***LOCAL AND REMOTE EMISSION CONTROL***
- ***SAFETY INTERLOCK***
- ***OEM CUSTOMIZATION AVAILABLE***

Spellman's XRM Series of regulated X-ray power supplies offer output voltages to 65kV and incorporate a filament supply which provides regulated dc current adjustable between 0.3A and 3.5A at 5.5V. High voltage and filament current can be linearly ramped up. The XRM incorporates local and remote programming, monitoring, safety interlock, short-circuit and overload protection.

TYPICAL APPLICATIONS

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

OPTIONS

AC	AC Filament
CPC	Constant Power
BIAS	Bias Supply
TP(x)	Alternate Test Point Scaling

SPECIFICATIONS

Input:
+24Vdc±10%, 4.25A maximum.

Output:
4 models with positive output polarity and adjustable voltages from zero to maximum voltage and current.

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.

Emission Control:
Local: Internal potentiometer to set beam current between 0 and full output.
Remote: 0 to +10Vdc proportional from 0 to full output current. Accuracy : ±1%. Z_{IN}: 10Mohm.

DC Filament Supply:
Current: 3.5A, adjustable
Voltage: 5.5V

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.

Ripple:
0.25% p-p of output voltage.

Temperature Range:
0°C to +50°C operational

Temperature Coefficient:
0.01% per °C, voltage or current regulated.

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:
6.3"H x 3.937"W x 10"D (16cm x 10cm x 25.4cm).

Connectors:
HV Output Connector: Delrin type connector, recessed. Cable assembly with mating connector 39.4in (1m).
I/O Connectors: 9 pin mini D-type Phoenix connector for power, filament and monitor connections.

Remote Programming:
(P/O 9 pin "D" analog control interface) Permits remote adjustment of the output voltage and current via an external potentiometer and the internal +10V reference. By adjusting the potentiometer from minimum to maximum, the desired output may be selected.

Remote Monitor:
Test points are made available at J4 for monitoring voltage and current outputs. The output polarity is positive from 0 to 10V equal to 0 to 100% of the output.

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XRM SELECTION TABLE

Maximum Rating		Model Number
kV	mA	
25	2.0	XRM25P50
30	1.67	XRM30P50
50	1.00	XRM50P50
65	0.77	XRM65P50

XRM MONITOR CONNECTOR 4 PIN

J4	SIGNAL		
1	Monitor Return	3	mA Monitor
2	kV Monitor	4	Intlk Enable

CONTROL INTERFACE MINI-D CONNECTOR 9 PIN

J5	SIGNAL		
1	+10Vdc Reference	6	mA Program Input
2	Spare	7	Remote/Local mA Program
3	kV Program Input	8	Spare
4	Remote/Local kV Program	9	Ground
5	Spare		

XRM FILAMENT CONNECTOR 3 PIN

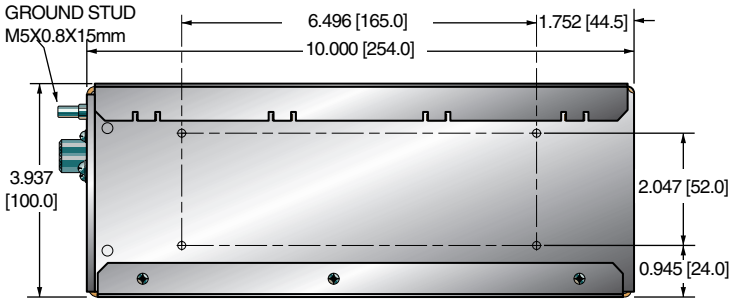
J3	SIGNAL	J3	SIGNAL
1	Filament Out	3	Spare
2	Filament Return		

XRM POWER CONNECTOR 2 PIN

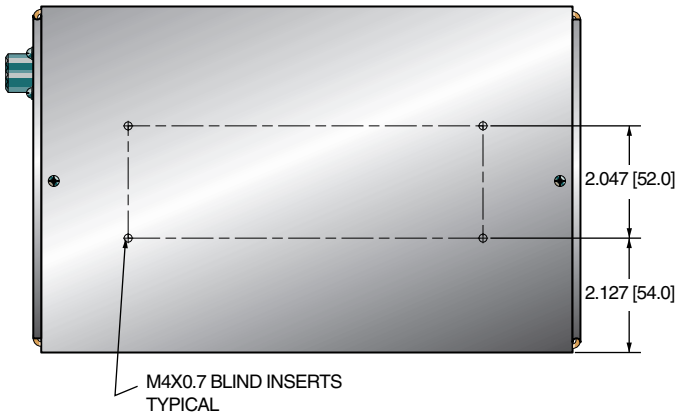
J2	SIGNAL
1	+24V Input
2	24V Return (Gnd.)

DIMENSIONS: in.[mm]

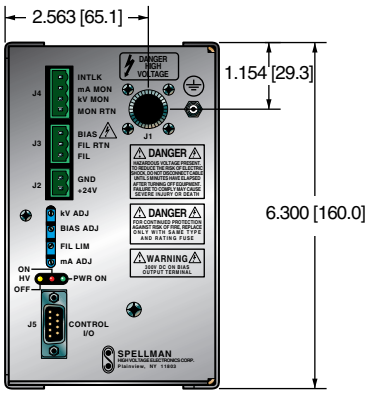
SIDE VIEW



TOP VIEW



BACK VIEW



89/336/EEC
73/23/EEC

X-RAY

- ***50KV AT 2 MA. 50 WATTS MAX.***
- ***ADJUSTABLE INTEGRATED FILAMENT SUPPLY***
- ***OVERVOLTAGE & SHORT CIRCUIT PROTECTION***
- ***VOLTAGE & CURRENT PROGRAMMING***
- ***LOCAL AND REMOTE EMISSION CONTROL***
- ***SAFETY INTERLOCK***
- ***OEM CUSTOMIZATION AVAILABLE***
- ***CE MARKED***
- ***UL RECOGNIZED***

The MNX 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 50 Watt X-ray generator module.

The MNX Series is designed to power grounded cathode X-ray tubes from a variety of well known manufacturers. It features a 0 to 50kV high voltage output, and up to 2mA of emission current limited to 50 Watts, operating from a +24Vdc input. The MNX utilizes a closed loop filamentry beam control circuit to provide a 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 both local and remote analog control to set beam voltage, emission current and filament current limit. An optional USB, RS232 or ethernet interface is available.

TYPICAL APPLICATIONS

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

OPTIONS

XCC	XRM Compatible HV Cable
SIC	Standard Interface Controller (Ethernet, USB & RS232)
5VPM	0 to 5 Volt Programming and Monitor Scaling

SPECIFICATIONS

Input:
+24Vdc±10%, 4.0A maximum.

Output:
0 to 50 kV at 0 to 2 mA, limited to a maximum of 50 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.

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.

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:
Standard Unit: 5.00"H x 2.87"W x 8"D (127.00mm x 72.90mm x 203.25mm).
XCC Option: 5.00"H x 2.87"W x 9"D (127.00mm x 72.90mm x 228.65mm).
SIC Option: 5.75"H x 2.87"W x 8"D (146.05mm x 72.90mm x 203.25mm).

Weight:
6.5 lbs. (2.9kg)

Unit shown above has XCC and SIC options installed

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MNX POWER INPUT CONNECTOR

J2	SIGNAL	
1	+24V Input	+24 volts @ 4A, max.
2	24V Return (Gnd.)	Power Ground

MNX FILAMENT CONNECTOR

J3	SIGNAL	
1	Filament Out	0.3A to 3.5A, 5 volt, max.
2	Filament Return	Filament Ground

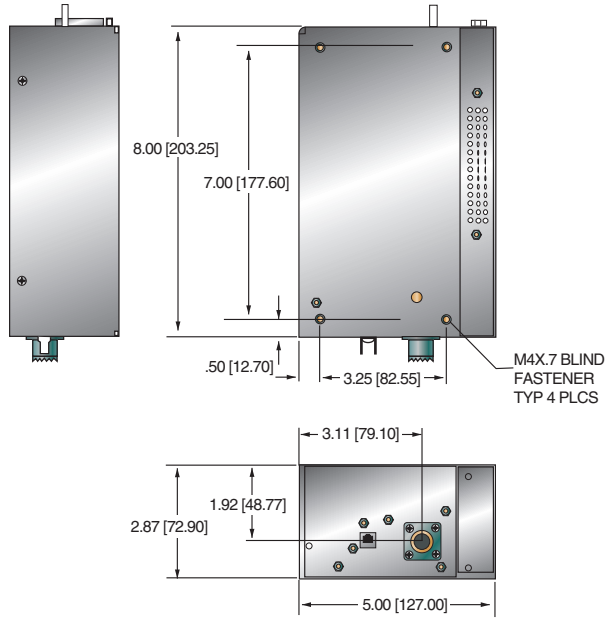
ANALOG INTERFACE CONNECTOR MALE 15 PIN MINI "D"

J4	SIGNAL	
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 located on front panel

DIMENSIONS: in.[mm]

STANDARD



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73/23/EEC

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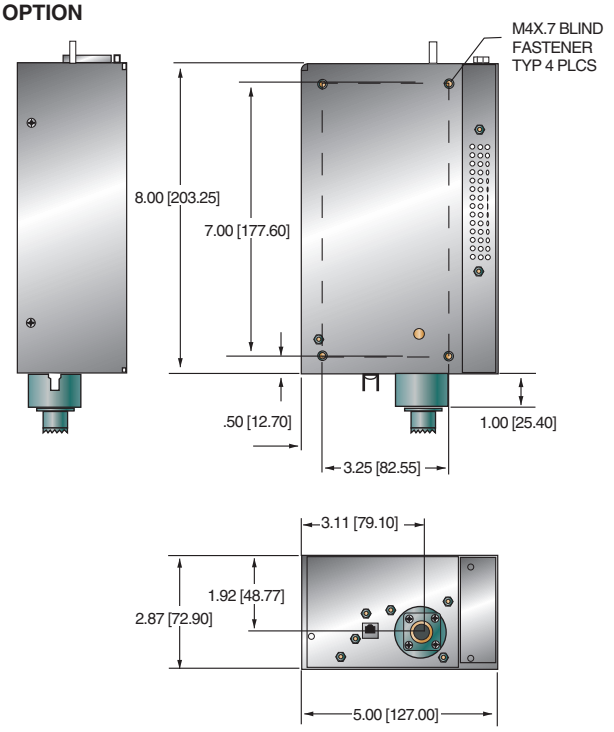
MNX HIGH VOLTAGE OUTPUT CONNECTOR

J1

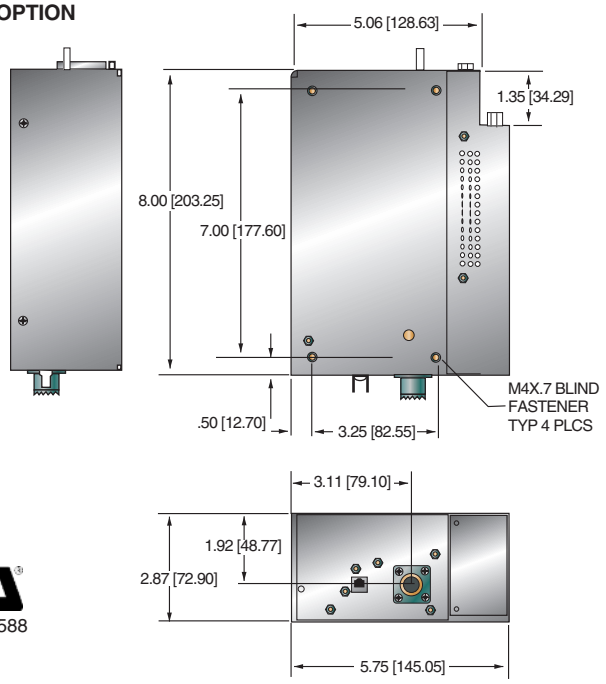
Spellman designed drywell type detachable connector. A one meter (39.4") long mating high voltage cable is provided.

DIMENSIONS: in.[mm]

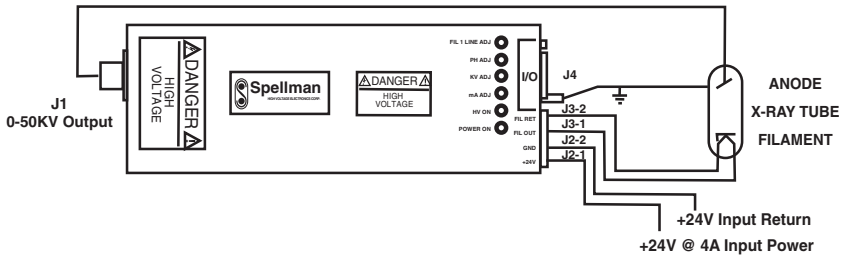
XCC OPTION



SIC OPTION

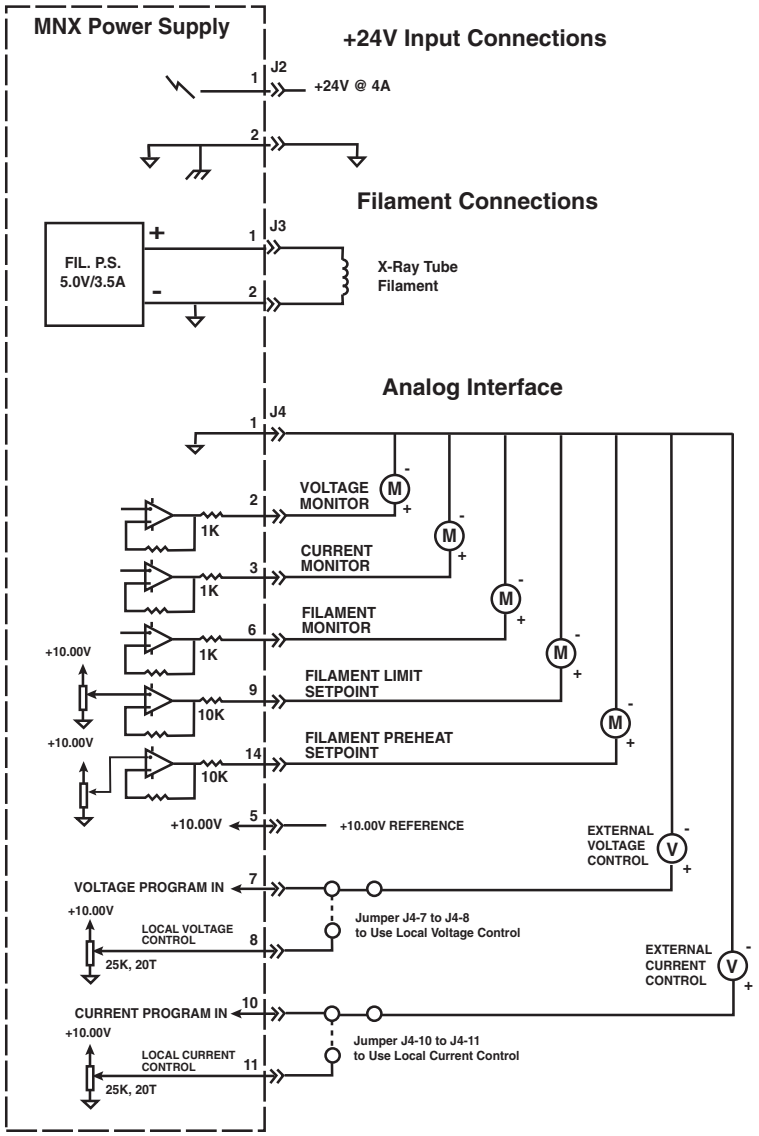


X-RAY

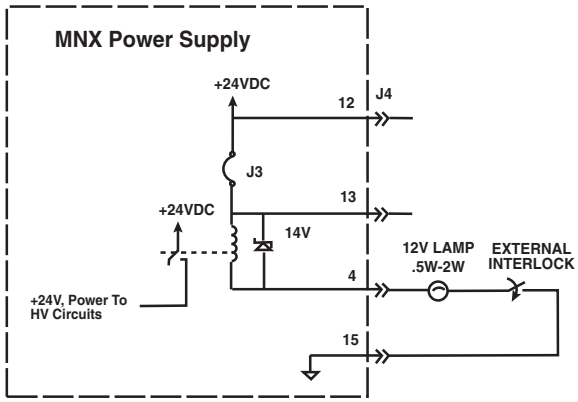


Typical MNX Operating Setup

See Wiring Diagrams for Recommended Analog Interface Connections



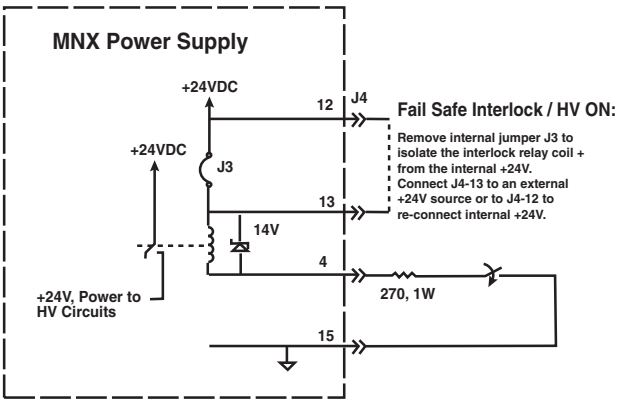
Analog Interface (continued)



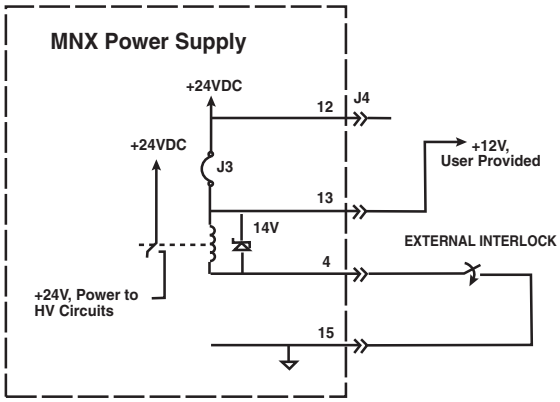
Fail Safe Interlock / HV ON Connections:

See accompanying drawings
for alternate configurations

Alternate Interlock Configurations



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



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- *160KV OUTPUT VOLTAGE*
- *RACK-MOUNTABLE*
- *FLOATING FILAMENT*
- *INTERNAL GRID POWER SUPPLY (80W MODEL)*
- *POWER FACTOR CORRECTION*
- *CLOSED-LOOP EMISSION CONTROL*
- *OEM CUSTOMIZATION AVAILABLE*

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

AOL	Adjustable Overload	**DF**	Dual Filament
GS	Grid Supply	**SL**	Slides
PC	Power Control	**APT**	Adjustable Power Trip
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; 3.0mA at 100kV.
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.

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 (80W Unit Only):
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 & 640W: 0 to +10Vdc, where 10.0Vdc = 160kV output.
320W: 0 to +10Vdc, where 8.0Vdc = 160kV output.
Beam Tube Current Control:
80W: 0 to +10Vdc, where 10.0Vdc = 0.5mA tube current.
320W: 0 to +6Vdc, where 6.0Vdc = 3.0mA 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)
80W, 320W, 640W: High Voltage and Beam Current Monitoring.
80W: Filament Current Monitoring.
320W & 640W: Internal filament current monitor test point not connected to the interface connector.
Digital Control Inputs:(See Tables For Details)
80W, 320W, 640W: Interlock Enable.
80W, 320W, 640W: HV Enable.
80W: Grid Inhibit.
640W: Filament Select.
Digital Outputs:(See Tables For Details)
HV ON.
Voltage Mode.
Current Mode.

X-RAY

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 Connections: 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).

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

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

JB1	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	Open=HV ON for 320W, Low=HV ON for 80W
6	A-Ground	Ground
7	kV Monitor	0-8V=0-160kV for 320W, 0-10V=0-160kV for 80W
8	Interlock Control	+12VDC IN = Interlock Closed
9	N/C	
10	mA Demand	0-6V=0-3mA for 320W, 0-10V=0-0.5mA for 80W
11	N/C	
12	N/C	
13	D-Ground	Ground
14	Fil. Monitor	0-5V=0-5A rms
15	N/C	
16	N/C	
17	N/C	
18	N/C	
19	mA Monitor	0-6V=0-3mA for 320W, 0-10V=0-0.5mA for 80W
20	N/C	
21	+12VDC Out	
22	kV Demand	0-8V=0-160kV for 320W, 0-10V=0-160kV for 80W
23	Grid Inhibit/Fil. Select	(Low=Grid Inhibit), Low=small spot size
24	N/C	
25	Chassis Gnd (I/O Shield)	Chassis Gnd.

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

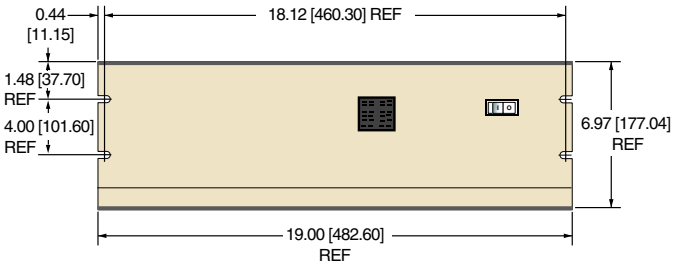
TB1	SIGNAL	SIGNAL PARAMETERS
1	Interlock	Jumper to TB2 to close interlock
2	Interlock Return	
3	kV Monitor	0-8V=0-160kV for 320W, 0-10V=0-160kV for 80W
4	mA Monitor	0-6V=0-3mA for 320W, 0-10V=0-0.5mA for 80W
5	Filament Monitor	0-5V=0-5A rms
6	Bias Monitor	Status Only. No Scale Factor(optional)
7	HV ON Indicator	+15V=HV ON
8	Voltage Mode Indicator	Low=Voltage Mode.
9	Current Mode Indicator	Low=Current Mode.
10	GND	Ground

160kV XRF SELECTION TABLE

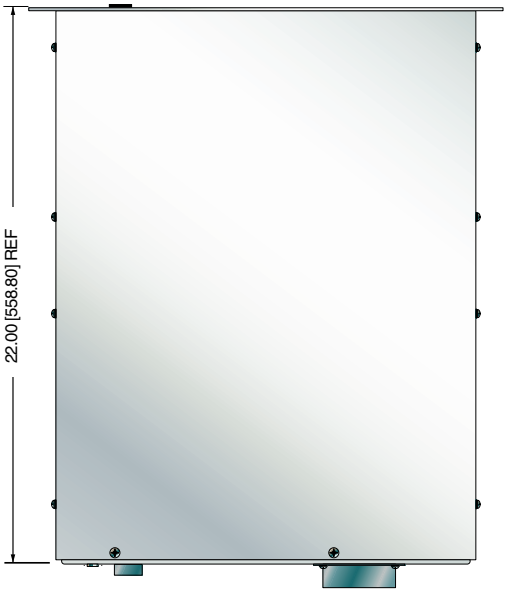
OUTPUT VOLTAGE kV	OUTPUT CURRENT mA	OUTPUT POWER W	MODEL NUMBER XRFxxx
160	0.5	80	XRF160N80
160	2.0	320	XRF160N320
160	4.0	640	XRF160N640

DIMENSIONS: in.[mm]

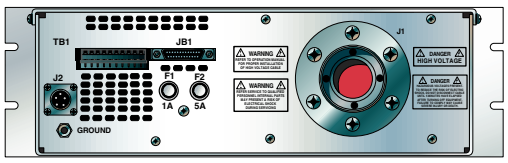
FRONT VIEW



TOP VIEW



BACK VIEW



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DXM 300W/600W X-RAY GENERATOR MODULE

- ***COMPACT & LIGHTWEIGHT***
- ***MODELS FROM 20KV-70KV, 300W-600W***
- ***UNIVERSAL INPUT, POWER FACTOR CORRECTED***
- ***HOT ANODE OR HOT CATHODE X-RAY TUBE CAPABILITY***
- ***STANDARD DIGITAL INTERFACES: USB, ETHERNET AND RS-232***
- ***CE COMPLIANT***

Spellman's new DXM Series of X-Ray generator modules are designed for OEM applications up to 70kV at 600 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 watt units

Output Voltage:
6 models—20kV, 30kV, 40kV, 50kV, 60kV and 70kV

Output Polarity:
Negative-for floating filament X-ray tubes
Positive-for ground referenced filament X-ray tubes

Power
2 power ranges available—300 watts and 600 watts
Other power levels available on special order.

Output Voltage Regulation:
≤0.01% of rated output voltage over specified input voltage range
≤0.01% of rated output voltage for a full load change

Emission Current Regulation:
≤0.01% of rated output current over specified input voltage range
≤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:
≤1%rms at >20 kHz, 0.1%rms below 20 kHz

Stability:
≤25ppm/hr after a 2 hour warm up

Temperature Coefficient:
≤50ppm 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 Xray 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. 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:
4.75˝ H X 6˝ W X 12˝ D (120.65mm x 152.4mm x 304.8mm)

Weight:
14 pounds (6.35kg)

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.

X-RAY

DXM SELECTION TABLE— 300W, 600W

300 Watt			600 Watt	
kV	mA	Model	mA	Model
20	15	DXM20*300	30	DXM20*600
30	10	DXM30*300	20	DXM30*600
40	7.5	DXM40*300	15	DXM40*600
50	6	DXM50*300	12	DXM50*600
60	5	DXM60*300	10	DXM60*600
70	4.28	DXM70*300	8.56	DXM70*600

*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, 50V @ 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, 50V @10mA Maximum
15	Spare	n/c

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

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	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	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 PINOUT

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

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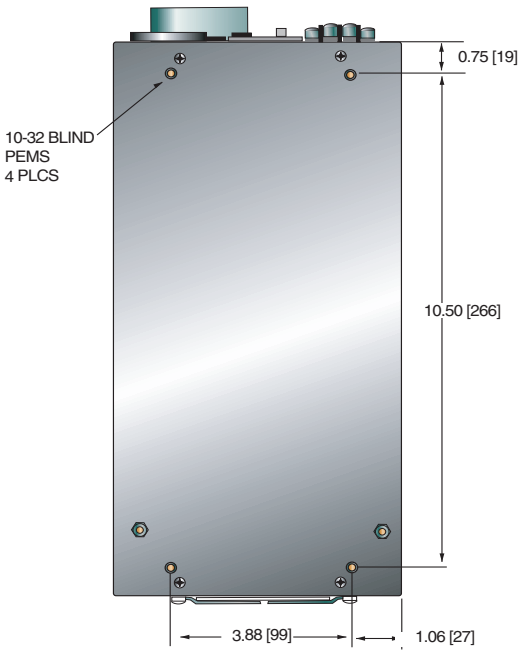
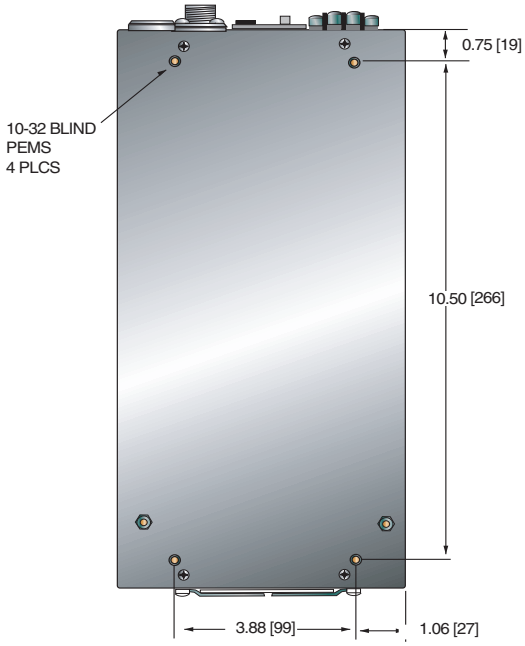
DIMENSIONS: in.[mm]

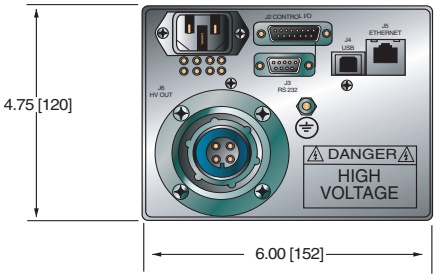
BOTTOM VIEW



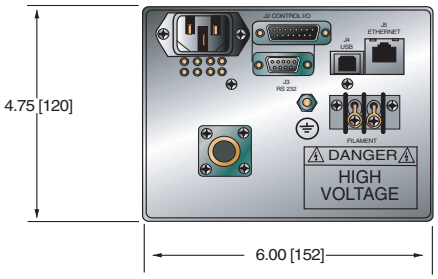
BOTTOM VIEW



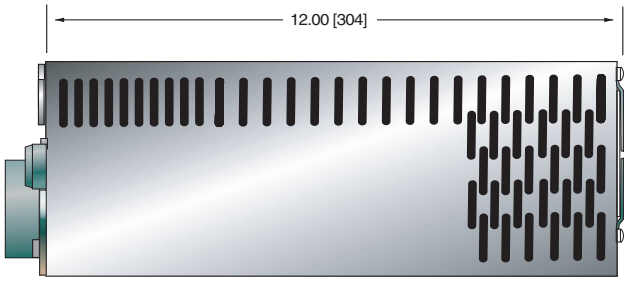
FRONT VIEW



FRONT VIEW

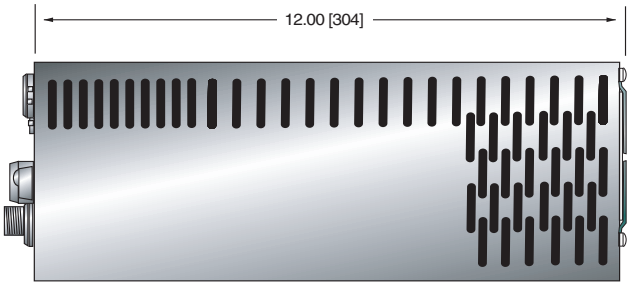


SIDE VIEW



Negative Polarity - Floating Filament

SIDE VIEW



Positive Polarity - Ground Filament

89/336/EEC
73/23/EEC

E227588

X-RAY

- ***OUTPUT VOLTAGES TO 60KV***
- ***INTEGRATED FLOATING FILAMENT SUPPLY***
- ***LOW RIPPLE***
- ***"HOT CATHODE"***
- ***NEGATIVE POLARITY***
- ***LOCAL & REMOTE PROGRAMMING***
- ***OEM CUSTOMIZATION AVAILABLE***

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.

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).

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

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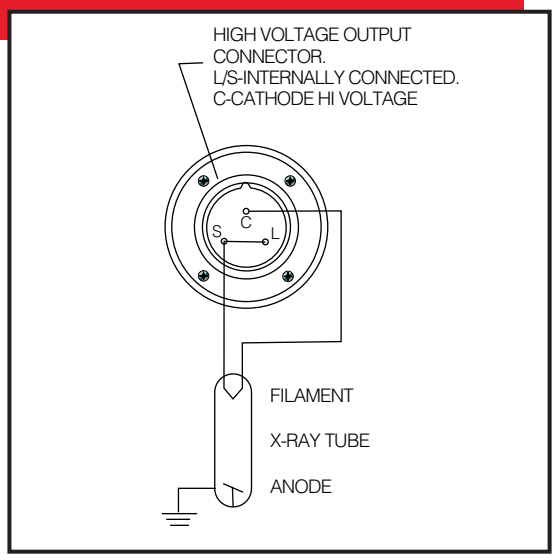
600W, 1200W XLF SELECTION TABLE

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

XLF CONNECTOR 25 PIN

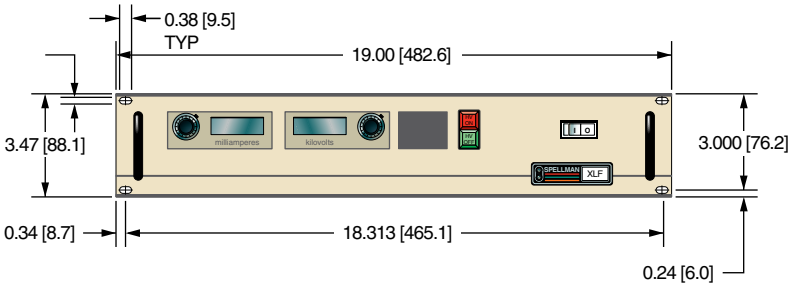
JB1	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated 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



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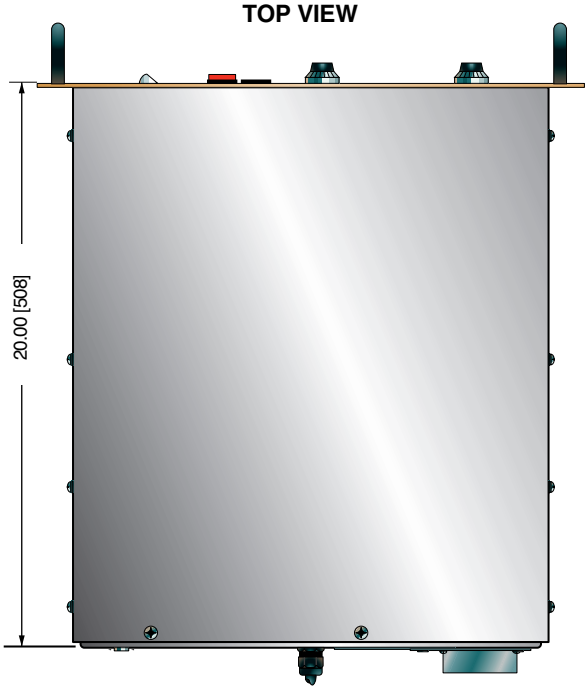
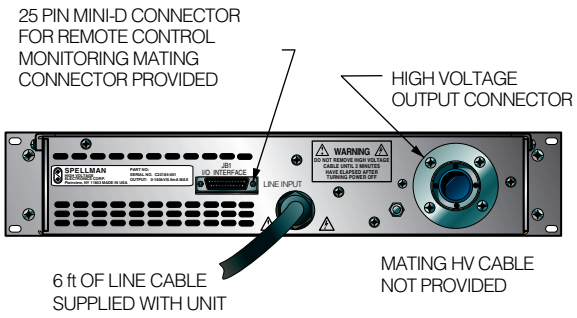


BACK VIEW



CE
89/336/EEC
73/23/EEC

X-RAY

DF/FF 3kW & 4kW X-RAY GENERATORS

- ***IDEAL FOR USE WITH MOST COMMON XRD & XRF X-RAY TUBES.***
- ***COMPACT SIZE, 5 1/4" (3U) HIGH CHASSIS.***
- ***GREATER THAN 85% EFFICIENCY.***
- ***HIGH STABILITY THROUGH PRECISION FEEDBACK CONTROL CIRCUITS.***
- ***SOLID ENCAPSULANTS INSURE MAINTENANCE-FREE OPERATION.***
- ***SYSTEM FAULT DIAGNOSTICS***
- ***AUTOMATIC RAMP OF THE HIGH VOLTAGE AND EMISSION CURRENT TO PRESET VALUES.***
- ***OEM CUSTOMIZATION AVAILABLE***

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 1/4" (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	RS232 Interface
220FSI	220Vac Fail Safe Interlock
208-3P	208Vac Three Phase Input

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.

Filament Voltage:
12Vac (dc filament optional).

Filament Current:
5A (up to 12A max available).

CE Mark:
Compliant to European EMC 89/336/EEC and LV 73/23/EEC directives.

Dimensions:
5¼"(3U) H x 19" W x 22" D
(13.3cm x 48.3cm x 55.9cm).

Shipping Weight:
90 lbs (40kg).

Environmental:
Temperature Range:
Operating: 0˚C to 40˚C
Storage: -20˚C to 85˚C
Humidity:
10% to 90%, non-condensing.

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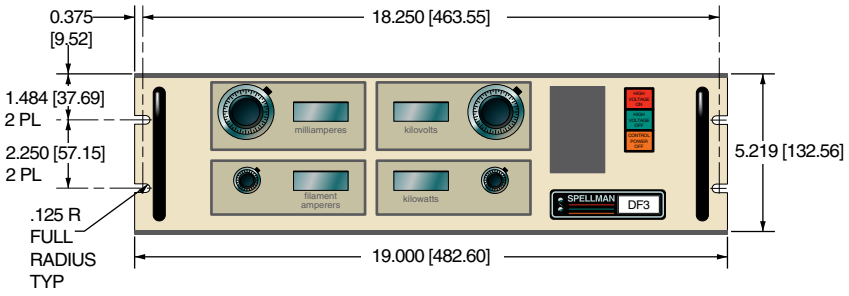
DIMENSIONS: in.[mm]

DF/FF MINI D CONNECTOR 50 PIN

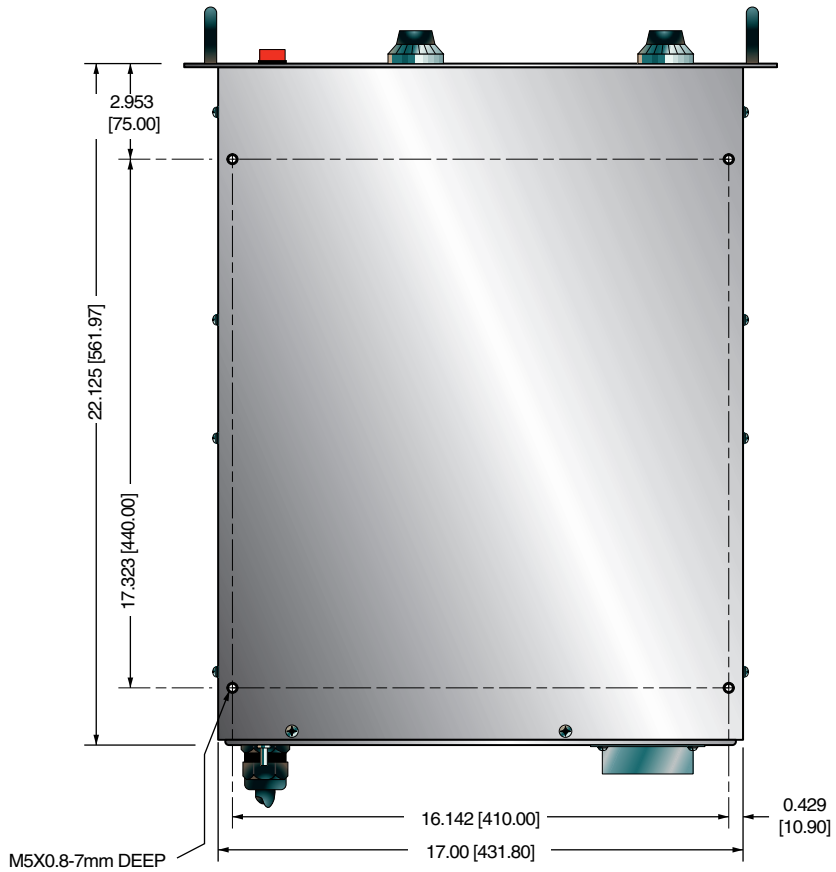
JB1	SIGNAL
1	+5Vdc (or connect to pin-11)
2	Control Power On
3	Intlk
4	X-ray On
5	X-ray Off
6	Spare
7	Spare
8	Reset
9	Rmt/Lcl
10	24V Switched
11	+5Vcch
12	X-ray On Status
13	Overvoltage
14	kV Min
15	Overpower
16	Filament Current Limit
17	mA Current Limit
18	$\overline{\text{LCL}}$ Status
19	Power Supply 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

CE 89/336/EEC 73/23/EEC

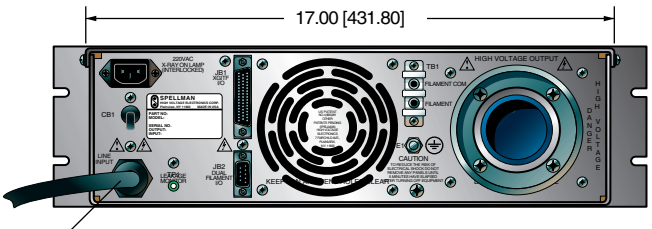
FRONT VIEW



TOP VIEW



BACK VIEW



X-RAY

- ***160KV, 225KV, 320KV AND 450KV MODELS***
- ***COMPLETE X-RAY GENERATOR PACKAGE***
- ***POWER FACTOR CORRECTED AC INPUT CIRCUITRY***
- ***INTEGRATED DUAL FILAMENT SUPPLIES***
- ***DIGITAL INTERFACE—USB, ETHERNET AND RS232***
- ***EXCELLENT STABILITY AND REGULATION***

Spellman's XRV series of X-Ray high voltage power supplies sets the standard for compact 3.0kW to 4.5kW, high performance X-Ray inspection generators. Spanning an output voltage range of 160kV to 450kV in negative or bipolar output polarity 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:
180-264Vac, 47-63 Hertz, power factor corrected input to ≥ 0.98

Input Current:
< 25 amps

Output Polarity:
See "model selection" table

Output Current:
See "model selection" table

Output Voltage:
Load: ±0.05% of rated output voltage for a full load change
Line: ±0.05% of rated output voltage over specified input voltage range
Ripple:
See "model selection" table
Accuracy:
0.25%
Stability:
≤0.1% per 8 hours, after 1 hour warm up
Temperature Coefficient:
50ppm/°C

Emission Current:
Load: ±0.05% of rated output current for a change from 30% to 100% of rated output voltage
Line: ±0.05% of rated output current over specified input voltage range
Accuracy:
0.25%
Stability:
100ppm/°C

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 4)

Operating Temperature
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Mains Input Connector:
Phoenix HDFK4

Interface Connectors:
Digital—Ethernet, RS-232 and USB
Analog—25 pin connector

Output Connector:
See "model selection" table

Cooling:
Forced air

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XRV SELECTION TABLE

	XRV160	XRV225	XRV320	XRV450
DC Output Voltage	0 to 160kV	0 to 225kV	0 to ±160kV	0 to ±225kV
Polarity	Negative	Negative	Bipolar	Bipolar
Output Rated Current	0-30mA	0-30mA	0-30mA	0-30mA
Output Power	3.0kW	3.0kW	4.5kW	4.5kW
Ripple/Noise (p-p)	<0.1%	<0.15%	<0.1%	<0.15%
Dimensions	10.5″H x 17″W x 24″D	16″H x 17″W x 31″D	2 x (10.5″H x 17″W x 24″D)	2 x (16″H x 17″W x 31″D)
Weight	150 lbs. (68kg)	240 lbs. (109kg)	300 lbs. (136 kg)	480 lbs. (218 kg)
Output Connector	R24	R28	Two R24	Two R28

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	Active low, turn on high voltage
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	Local Control	Active low, local control selected
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

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

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

TB1 MAIN AC INPUT POWER— PHOENIX HDFK4

PIN	SIGNAL	PARAMETERS
L	AC Line	180-264Vac
N	AC Neutral	Neutral
G	Electrical Ground	Ground

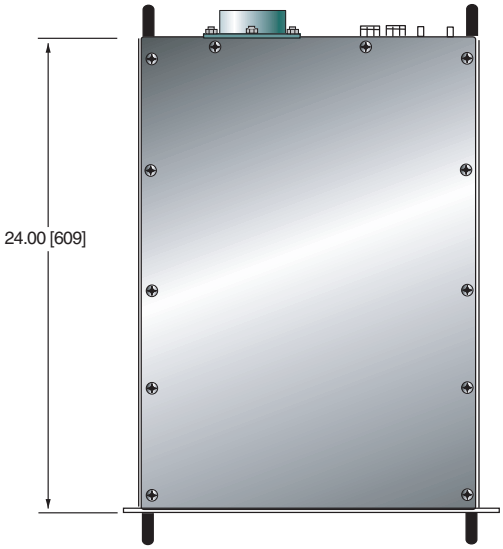
TB2 AUXILIARY AC INPUT POWER— PHOENIX HDFK4

PIN	SIGNAL	PARAMETERS
L	AC Line	180-264Vac
N	AC Neutral	Neutral
G	Electrical Ground	Ground

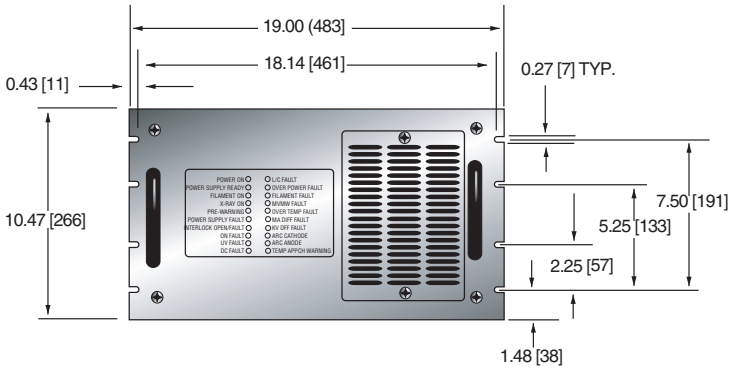
DIMENSIONS: in.[mm]

XRV160

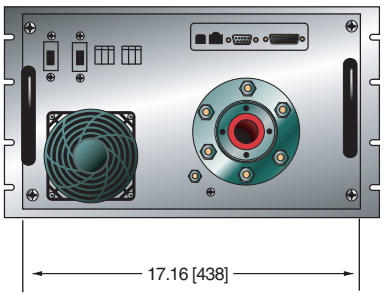
TOP VIEW



FRONT VIEW



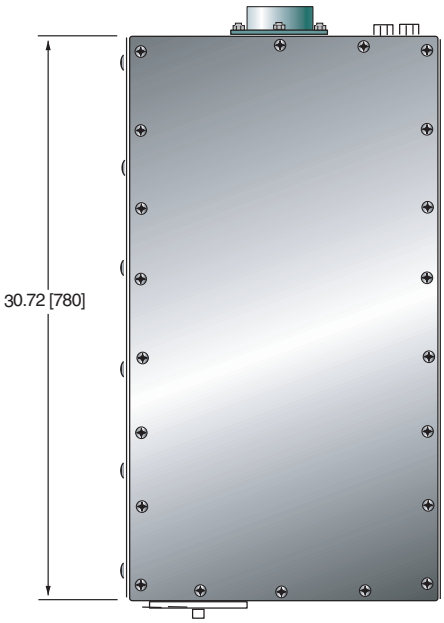
REAR VIEW



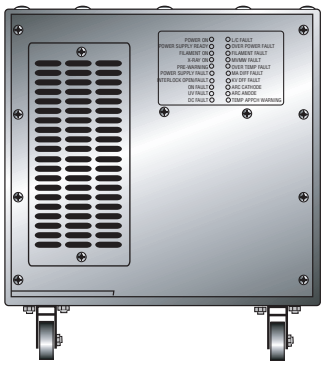
XRV320 is comprised of two XRV160 units configured in a bipolar arrangement

XRV225

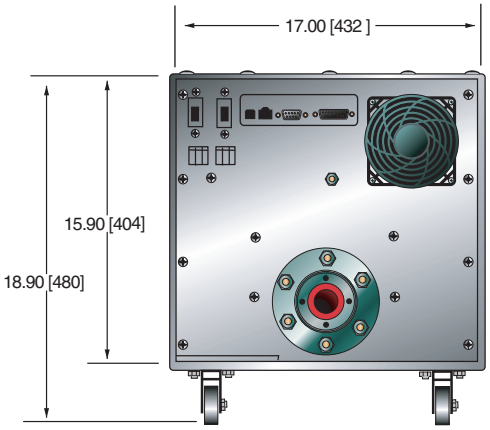
TOP VIEW



FRONT VIEW



REAR VIEW



XRV450 is comprised of two XRV225 units configured in a bipolar arrangement

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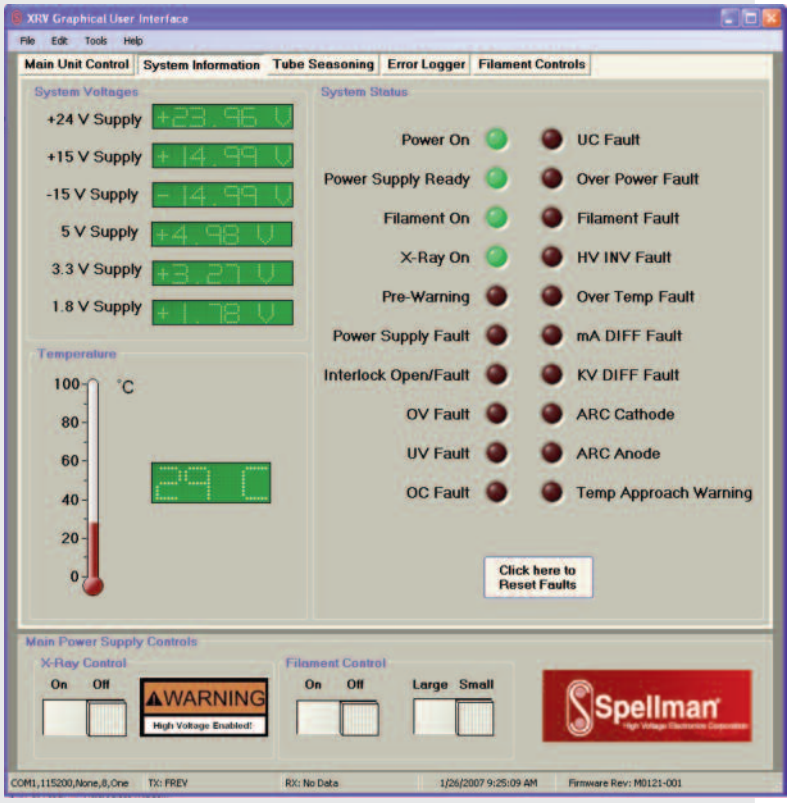
GUI CONTROL SOFTWARE FOR XRV

The 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 use 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***



- ***COMPLETE X-RAY GENERATOR PACKAGE***
- ***INTEGRATED HIGH VOLTAGE/FILAMENT/STATOR SUPPLY***
- ***DIGITAL INTERFACE—USB, ETHERNET AND RS232***
- ***EXCELLENT STABILITY AND REGULATION***

Spellman's new MAMX Series of X-Ray generators set the standard for compact, high performance Mammography applications. Microprocessor based SMT control circuitry provides your choice of USB, Ethernet or RS232 interfacing. Spellman's proprietary pulse width modulated inverter topology allows for unprecedented efficiencies and power densities. A solid encapsulated high voltage section further reduces size and provides reliable, maintenance free operation.

The internal DC output, current regulated filament supply is controlled via sophisticated emission current regulation circuitry to provide accurate and stable X-ray tube currents. A high speed starter complete with Boost and Brake functions is also incorporated into this efficient, space saving X-ray generator.

SPECIFICATIONS

Input Voltage:

Standard

Mains - 380 to 415Vac, 3 phase, ±10% 50/60Hertz

Auxiliary - 230Vac, single phase, ±10%, 50/60Hertz

Optional

Mains & Auxiliary - 180 to 264Vac, single phase, 50/60 Hertz

Output Voltage: 20kV to 40kV

Polarity:	Positive, for grounded cathode X-ray tube
Accuracy:	<1%
Reproducibility:	<0.5%
Settling Time:	≤50mS to within 95% of programmed voltage
Ripple:	≤1%rms >10 kHz, 0.1%rms below 10 kHz
Stability:	≤0.01% per 8 hours
Temperature Coefficient:	≤100ppm/°C

Emission Current: 50mA to 230mA

Power:	9kW peak, 1.17kW average (13% duty cycle)
Accuracy:	<1%
Reproducibility:	<0.5%
Settling Time:	≤70mS to within 95% of programmed current

Filament:

Configuration:	DC filament drive. Closed loop emission control regulates filament setting to provide desired Xray tube emission current.
Output:	0-6 amps at a compliance of 5.5 volts, maximum.
Dual Focal Spot:	Available as an option.

High Speed Starter:

Rotational Speed:	Anode rotation speed of at least 10,000 RPM
Functionality:	Boost and Brake capability provided

Control Interface:

Remote Interface:	USB, Ethernet and RS232 are standard.
Control Software:	A VB GUI will be provided for RS-232/USB, the Ethernet interface will have an embedded applet for control.

Operating Environment:

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

Mechanical:

Input Connector:	4 position terminal bock (mains), 2 position terminal block (aux)
HV Output Connector:	60kV, Claymount CA-3 type
Stator/Filament Connector:	9 pin AMP 206708-1
Interface Connector:	25 pin D connector
Cooling:	Forced air.
Dimensions:	7.87˝W X 3.93˝D X 27.62˝H (200mm X 160mm X 701mm)
Weight:	50 lbs. (22.68 kg)

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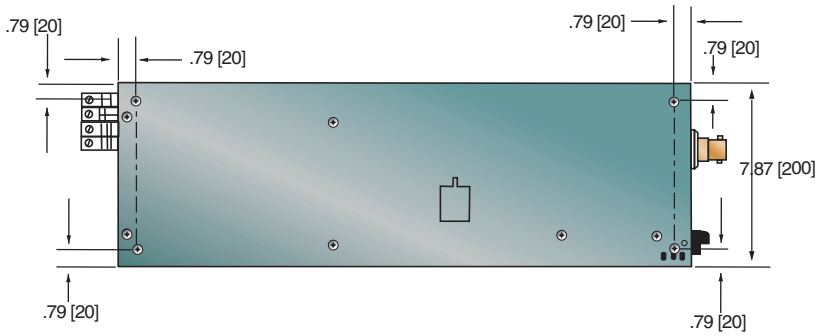
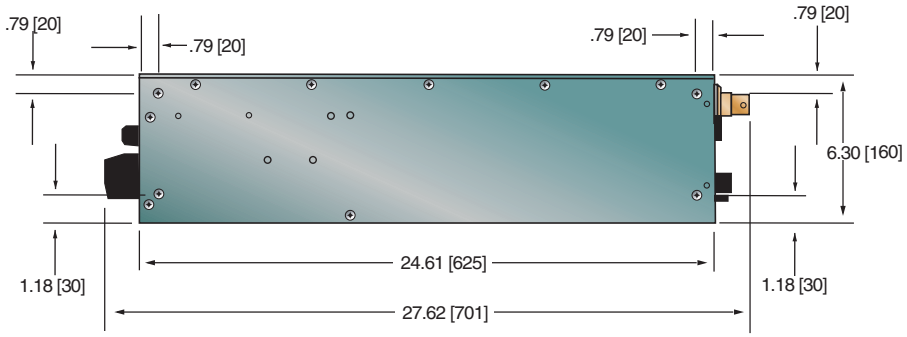
DIMENSIONS: in.[mm]

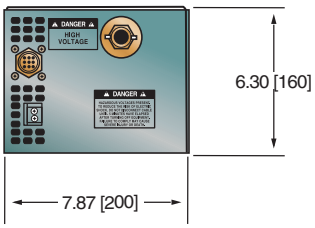
TOP VIEW



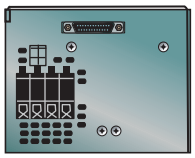
SIDE VIEW



FRONT VIEW



BACK VIEW



CE
89/336/EEC
73/23/EEC

X-RAY

165kV, 400mA, 60kW CT SCANNER SUPPLY

- ***OUTPUT VOLTAGE: 0 TO ±82.5KV (165KV ACROSS THE TUBE)***
- ***EMISSION CURRENT: 0 TO 400MA***
- ***OUTPUT POWER: 60KW PEAK***
- ***FILAMENT: 15VDC, 0 TO 6A REFERENCED TO CATHODE***
- ***DUAL FOCAL SPOT***
- ***CONTROLS FOR KV, MA, FILAMENT***

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 a highly reliable 60kW scanner power supply specifically designed to meet the exacting requirements for helical scanning. It has low ripple to make enhanced image quality possible.

Various other power levels and configurations are available for OEM requirements. Contact our sales department for additional details.

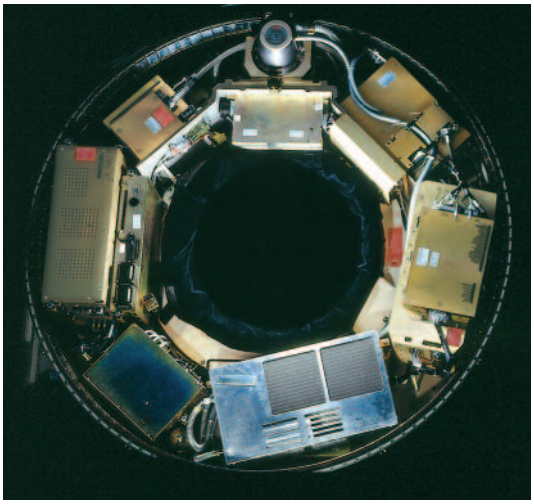


Photo Courtesy of Picker International, Inc.

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- ***DUAL FOCAL SPOT***
- ***CONTROLS FOR KV, MA, FILAMENT CURRENT AND POWER LIMIT***
- ***DIGITAL METERING FOR KV, MA, FILAMENT CURRENT AND POWER***
- ***FEDERAL STANDARD 75KV CONNECTORS FOR ANODE AND CATHODE***
- ***OEM CUSTOMIZATION AVAILABLE***

The rugged Spellman 24kW X-ray Tube Test System provides anode and cathode voltage, filament power and extensive local and remote controls for integration into automatic Tube Test and Aging Systems.

SPECIFICATIONS

Output Voltage:
0 to ±75kV (150kV across the tube).

Emission Current:
0 to 200mA.

Output Power:
24kW continuous, 30kW peak output.
1 minute ON with a 25% duty cycle.

Slew Up:
0 to 75% in ≤ 10mS.

Slew Down:
100 to 25% in ≤ 50mS.

Filament:
5Vdc, 0 to 8A referenced to cathode.

Size:
52.5”H x 19”W x 36”D (133.4cm x 48.3cm x 91.4cm).

- ***COMPACT & LIGHTWEIGHT PACKAGE***
- ***POWER FACTOR CORRECTED INPUT***
- ***LOW COST MODULAR OEM PLATFORM***
- ***RUGGED IGBT INVERTER DESIGN***
- ***AUXILIARY +24VDC @ 2.2 AMP OUTPUT PROVIDED***

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-79-19, 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)

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AUXILIARY +24VDC CONNECTOR J2 2 POSITION AMP CONNECTOR

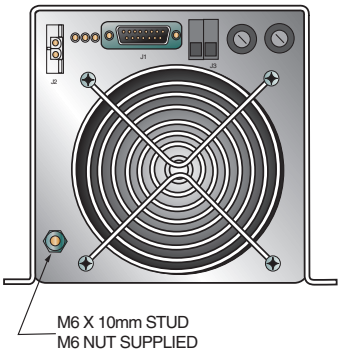
J2	SIGNAL	SIGNAL PARAMETERS
1	+24Vdc	+24Vdc @ 2.2 amps
2	Ground	Ground

CCM ANALOG INTERFACE— J1 15 PIN FEMALE D CONNECTOR

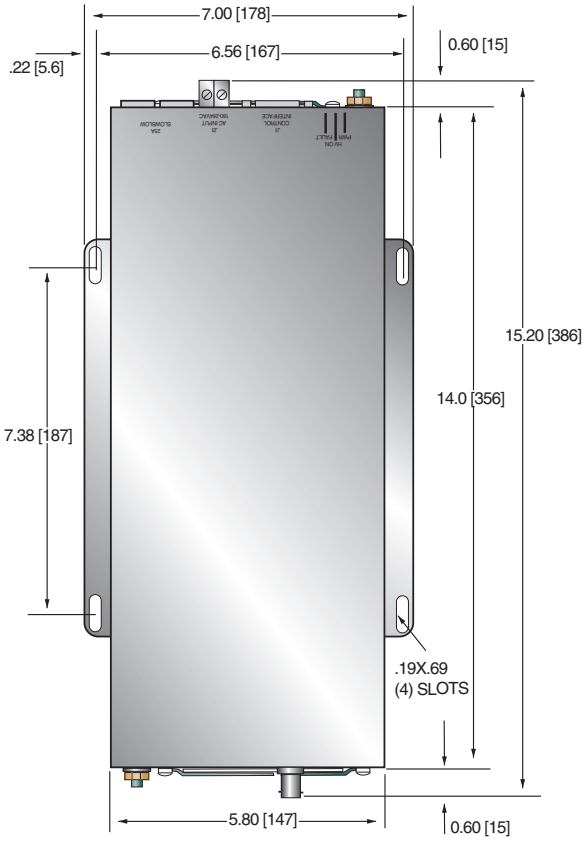
PIN	SIGNAL	SIGNAL PARAMETERS
1	Inhibit	Ground = HV ON, High = HV OFF
2	Temperature Fault	Ground = No Fault, +15Vdc = Fault +15Vdc through 6.8kΩ
3	General Fault	Ground = No Fault, +15Vdc = Fault +15Vdc through 6.8kΩ
4	HV ON Indicator	Ground = HV ON, +15Vdc = HV OFF +15Vdc through 6.8kΩ
5	Voltage Program	0 to 10Vdc = 0 to 100% Rated Output
6	Open Circuit Detector	Ground = Open Circuit, +15Vdc = OK +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]

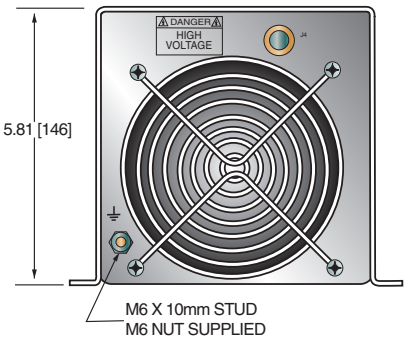
FRONT VIEW



TOP VIEW



BACK VIEW



CE 89/336/EEC 73/23/EEC

APPLICATION SPECIFIC

- ***TRIODE SUPPLY FOR ELECTRON BEAM COLUMNS***
- ***HIGH PRECISION, LOW NOISE, ULTRA STABLE***
- ***SINGLE INTEGRATED OEM MODULE***
- ***OVER CURRENT AND OVER VOLTAGE PROTECTION***
- ***ARC AND SHORT CIRCUIT PROTECTION***
- ***EASILY CUSTOMIZED FOR OEM APPLICATIONS***

Spellman's EBM High Voltage Triode Module designed for driving E-Beam Columns in Scanning Electron Microscopes, provides the required acceleration, bias and filament sources in one compact OEM modular package. Spellman's proprietary high voltage packaging and encapsulation technology provides dramatic improvements in size, cost and performance when compared to other power supply offerings for SEM applications.

The EBM provides a highly regulated, low noise, ultra stable accelerator supply programmable from 0 to 30kV at a maximum current of 300uA. A floating bias supply of 0 to 6kV at 150uA and a floating filament supply (both programmable sources referenced to the accelerator output) are also provided. All programming signals utilize differential inputs to minimize effects of noise and offset voltages. A ground referenced accelerator current monitor is also provided. The EBM is immune against arc and short circuiting, along with over voltage and over current protection.

TYPICAL APPLICATIONS

Scanning Electron Microscope

SPECIFICATIONS

Input Voltage:

+24Vdc, +/-5%, connector JHA2 type, AMP 350760-3

High Voltage Outputs:

Accelerator:

Voltage: 0V to -30kV full load, -35kV no load
Current: 300µA maximum (including feedback current), continuous current 200µA maximum from -0.5kV to -30kV
Accuracy: ±1% from -0.5kV to -30kV
Load Regulation: <±100ppm
Line Regulation: <±100ppm for 10% line change
Ripple: <10ppm p-p at -30kV, 200µA, maximum bias and filament
Temperature Coefficient: <100ppm/°C
Stability: 8ppm/3 minutes at 150µA load current after 1 hour warm up

Bias: (Referenced to Accelerator)

Voltage: 0 to +6kV
Current: 150µA maximum
Accuracy: ±10% of FS or ±180V, which ever is greater
Line Regulation: <±0.1% for 10% line change
Ripple: <150mVp-p
Temperature Coefficient: <1000ppm/°C
Stability: 1%/10 minutes

Filament: (Referenced to Accelerator)

Power: 0 to 15W
Load Resistance:1Ω ±5%
Accuracy: ±3% of FS or 0.1W, which ever is greater
Load Regulation: <1% for 10% change in load resistance
Line Regulation: <100ppm for 10% line change
Ripple: <0.1% p-p max
Temperature Coefficient: <300ppm/°C
Stability:100ppm/10 minutes

Interface:

Analog control for beam energy, filament and bias.

Temperature:

Operating: 0°C to +40°C.
Storage: -20°C to +50°C.

Humidity:

20 to 85% RH, non-condensing.

Dimensions:

4.17˝ H X 10.83˝ W X 10.43˝ D
(106mm x 275mm x 265mm)

Weight:

<22 lbs. (10kg)

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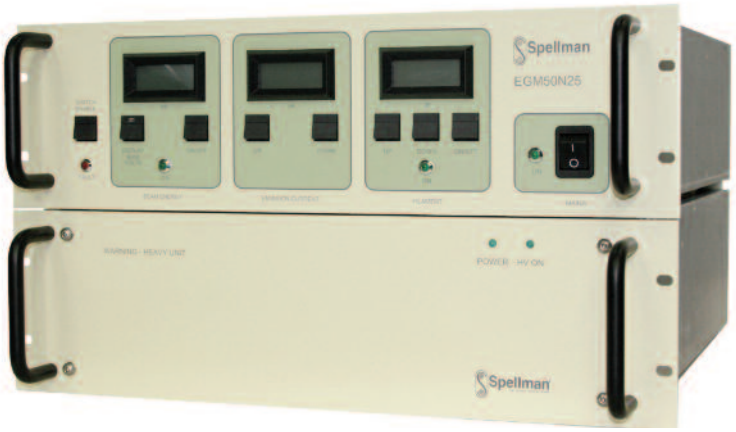

- ***LOCAL OR REMOTE CONTROL OF BEAM ENERGY, FILAMENT POWER AND EMISSION CURRENT***
- ***INTEGRATED FLOATING FILAMENT SUPPLY***
- ***ACTIVE BIAS SYSTEM***
- ***RS-232 CONTROL AND MONITORING INTERFACE***
- ***HIGH STABILITY LESS THAN 2.5 PPM***
- ***CUSTOM PRODUCTS AVAILABLE***

Spellman's precision Electron Gun Power Supply is designed to achieve extremely high stability and low ripple. The EGM 50 incorporates an integral floating filament supply and and active bias. Full control via RS232 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.

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 (68lbs.)

BEAM ENERGY

Output Voltage:
-50kV fixed, adjustable ± 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

APPLICATION SPECIFIC

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

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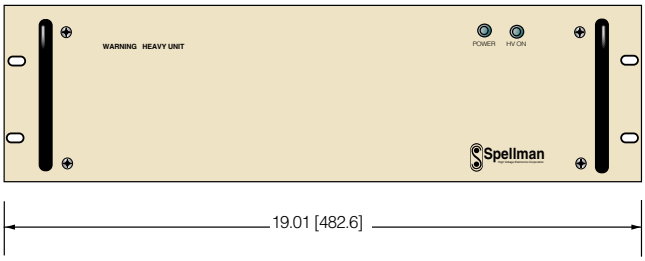
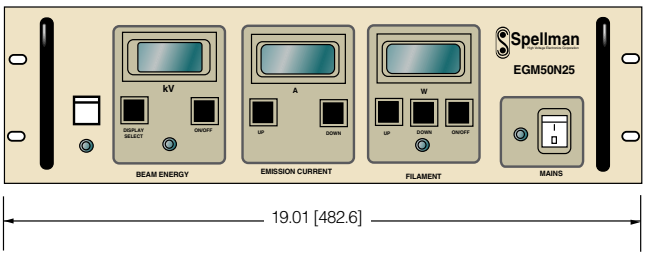
DIMENSIONS: in.[mm]

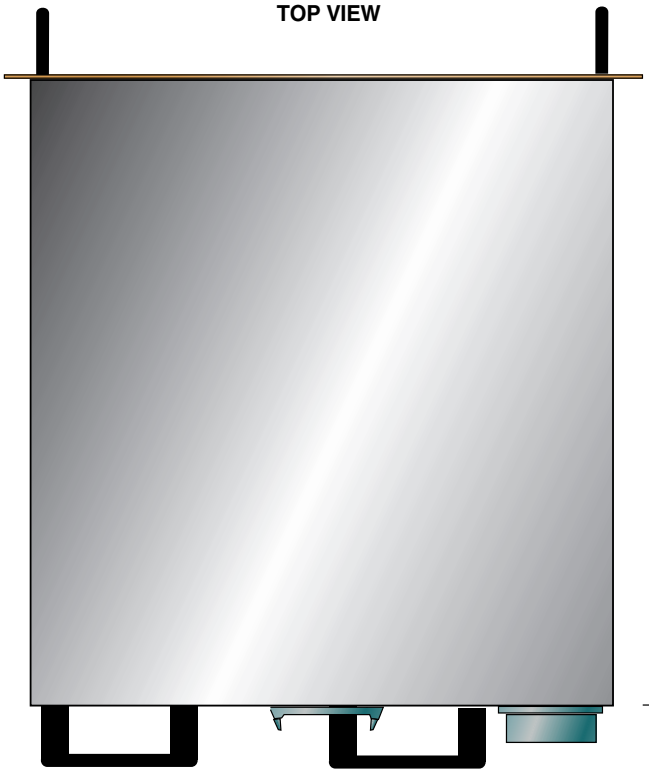
FRONT VIEW



FRONT VIEW



TOP VIEW



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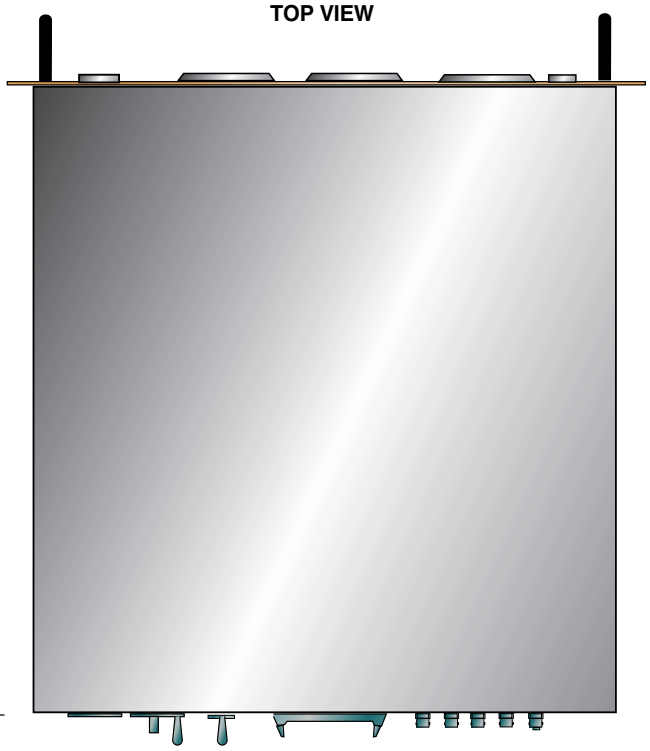
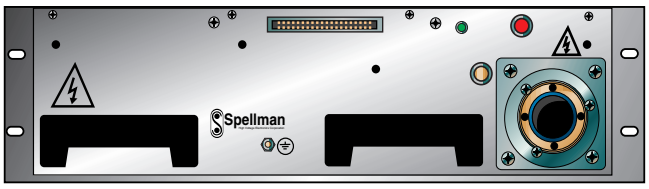


BACK VIEW



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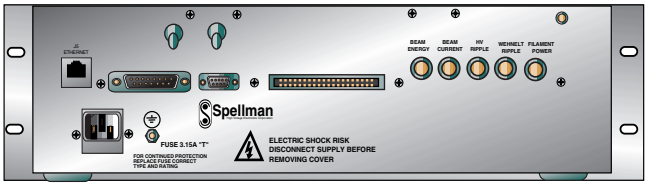

CE
89/336/EEC
73/23/EEC

APPLICATION SPECIFIC

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

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

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

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

TYPICAL APPLICATIONS

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

SPECIFICATIONS

Input Voltage:
105 to 240Vac, 47 to 63 Hz

ACCELERATOR SUPPLY Referenced to Ground

Output Voltage:	0 to +45 kV
Output Current:	30 µA
Ripple:	200 mV p-p, from 0.1 Hz to1 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 Referenced to Accelerator

Output Voltage:	0 to 5 Vdc
Output Current:	0 to 5 A
Ripple:	10 mA p-p from 0.1 Hz to 1 MHz
Line Regulation:	5 mA for +/-10% line change
Load Regulation:	±0.1% of maximum voltage for full load change
Stability:	5 mA/10 minutes after 2 hour warm-up
Temperature Coefficient:	200 ppm /°C

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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 21

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 55 lbs (25 kg)

APPLICATION SPECIFIC

- ELECTRON BEAM HIGH VOLTAGE POWER SUPPLY
- 100KV OUTPUT CAPABILITY
- LOW/HIGH 10µA/100µA OUTPUT CURRENT SELECTION
- LESS THAN 75 mV OF RIPPLE
- EXCELLENT REGULATION AND STABILITY PERFORMANCE
- OIL FREE/SOLID ENCAPSULATED DESIGN

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. It's 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

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

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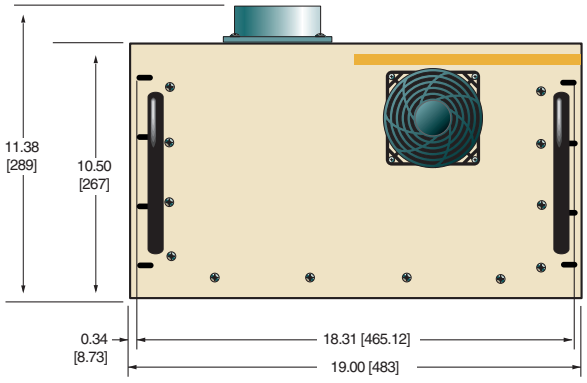
REMOTE INTERFACE CONNECTOR:

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

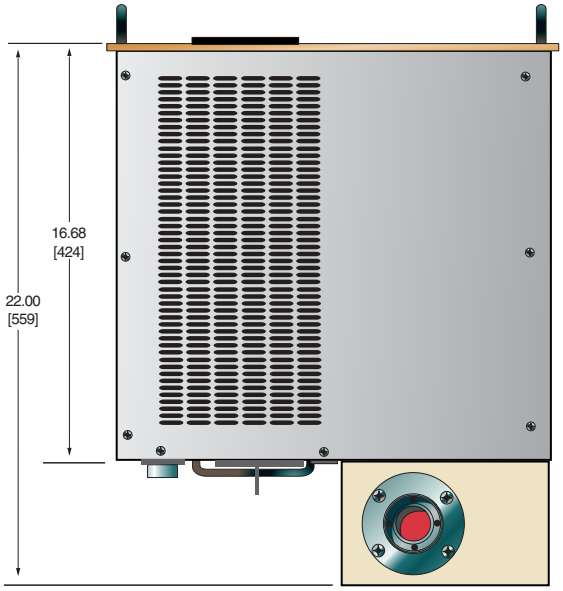
DIMENSIONS: in.[mm]

HV CHASSIS

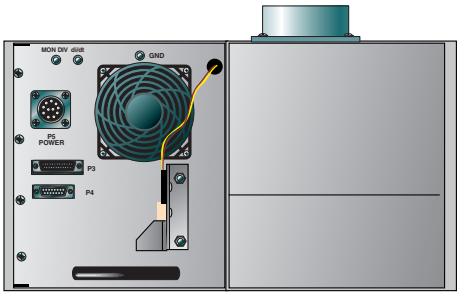
FRONT VIEW



TOP VIEW

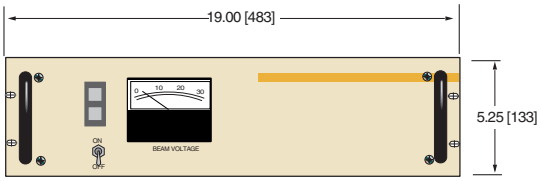


BACK VIEW

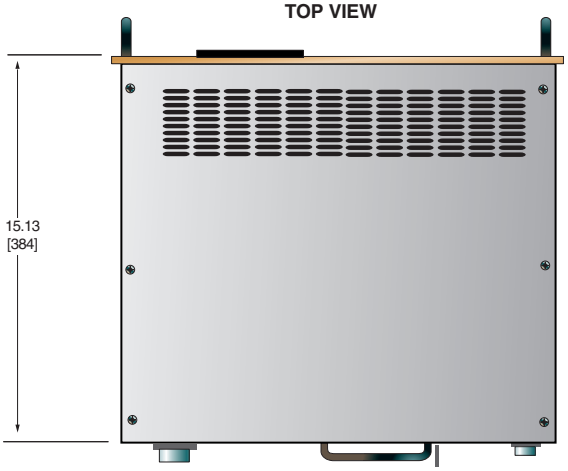


CONTROL CHASSIS

FRONT VIEW



TOP VIEW



BACK VIEW

CE
89/336/EEC
73/23/EEC

APPLICATION SPECIFIC

1.5kV TRUE FLOATING OUTPUT ELECTROSTATIC CHUCK POWER SUPPLY

Bi-polar E-chuck

- *30W TO 75W PER CHANNEL*
- *INPUT VOLTAGE: 48VDC OR 24VDC*
- *COMPLETE MONITORING OF OUTPUT VOLTAGE AND CURRENT*
- *REVERSIBLE POLARITY*
- *DUAL OUTPUT*
- *FLOATING OUTPUT VOLTAGE*
- *INTERLOCK CIRCUITRY & FAULT INDICATION*
- *COMPACT SIZE: 6.6"H X 2.25"W X 9.5"D (16.8CM X 5.7CM X 24.1CM)*

ESC Series electrostatic chuck power supplies provide steady and accurate bi-polar voltages required for electrostatic wafer processing applications. These well regulated supplies effectively secure the chuck during long hold cycles. Additional features include a true floating output with an independent center-tap point and an internal interlock circuit which shuts down power if faults occur. The ESC power supplies are housed in compact, lightweight packages designed for flexible installation in tight spaces.

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www.spellmanhv.com

- ***30KV OUTPUT VOLTAGE, PROGRAMMABLE***
- ***0-300µA LOAD CURRENT, PROGRAMMABLE***
- ***AUTO POLARITY REVERSING UPON DIGITAL COMMAND IN <1 SEC AT NO LOAD***
- ***LOW STORED ENERGY***
- ***DIGITAL ON/OFF CONTROL***
- ***OEM CUSTOMIZATION AVAILABLE***

Spellman's CZE2000 and CZE1000R high voltage power supplies are designed to meet the requirements of applications requiring a hot switched reversible output voltage. The dc output voltage and current are continuously adjustable from 0 to 30kV and 0 to 300µA. Output polarity is reversible on command.

TYPICAL APPLICATIONS

Capillary Electrophoresis
Mass Spectrometers

OPTIONS

Rack Mount with meters and controls (CZE1000R)
Alternate Input Voltage
Alternate Test Point Scaling
Special Connectors
Rear Panel HV Output

SPECIFICATIONS

Input Voltage:
CZE1000R: 115Vac or 220Vac ±10%, 50/60Hz specified with order.
CZE2000: 24Vdc±10%.

Input Current:
1.25A max.

Output Voltage:
0 to 30kV programmable.

Output Current:
300µA max from 1 to 30kV.

Line Regulation:
0.01% for a 10% V_{input} change.

Load Regulation:
0.01% for a no load to full load change.

Ripple:
0.1% p-p.

Voltage Test Point:
0 to 10V±1% full scale.

Current Test Point:
0 to 10V±2% full scale.

Remote Enable:
3.4V=ON;<1V=OFF.

Output Time Constant with no load:
0.1 sec.

Stored Energy:
0.2 Joules at 30kV.

Dimensions:
CZE1000R:
5.25"H x 19"W x 17"D (13.3cm x 48.3cm x 43.2cm).
CZE2000:
3.5"H x 5"W x 10"D (8.9cm x 12.7cm x 25.4cm).

CZE1000R TERMINAL BLOCK 14 PIN

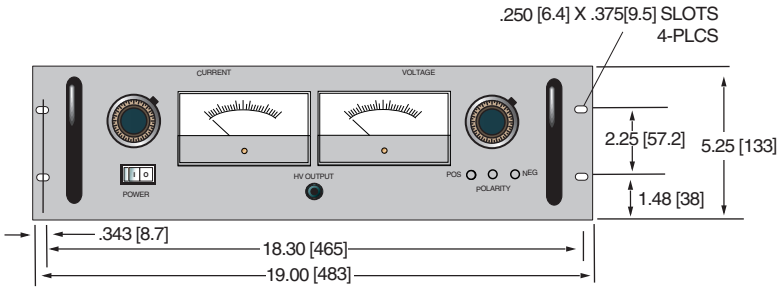
TB1	SIGNAL	TB1	SIGNAL
1	10V Reference	8	Current Test Point
2	Internal Voltage Control	9	External Interlock
3	Voltage Program Input	10	External Interlock
4	Internal Current Control	11	10V Reference
5	Current Program Input	12	Enable
6	Signal Common	13	Spare
7	Voltage Test Point	14	Spare

CZE2000 CONNECTOR 25 PIN

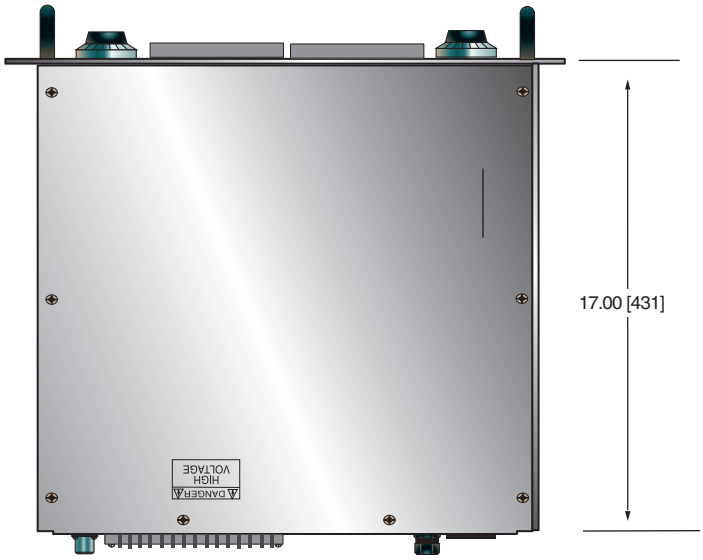
J2	SIGNAL
1,2, 3	Chassis Ground & 24Vdc Return
4	High Voltage Enable/Inhibit
5	Voltage Test Point
6	Output Current Test Point
7	Chassis Ground
8	Remote Voltage Control
9	Remote Current Control
10	+10Vdc Reference
11	Test Point & Remote Prog. Return
12	Polarity Control Signal
13	Positive Polarity Indicator
14, 15	+24Vdc
16	Chassis Ground
17	Negative Polarity Indicator
18	I-Mode Indicator
19	V-Mode Indicator
20	Return Current Test Point
21	Load Return
22	Ground Fault Indicator
23, 24, 25	Spares

CZE1000R: DIMENSIONS: in.[mm]

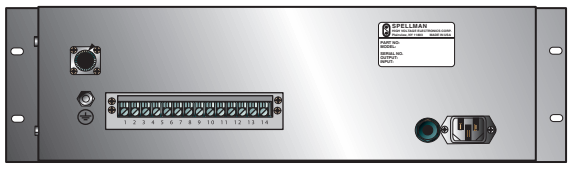
FRONT VIEW



TOP VIEW

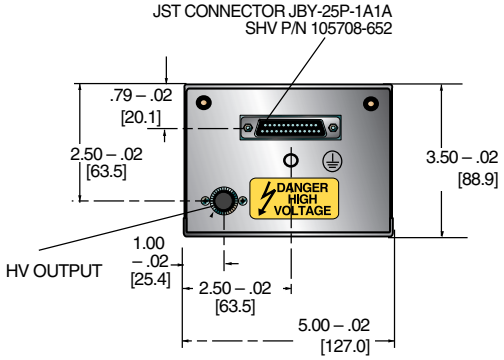


BACK VIEW

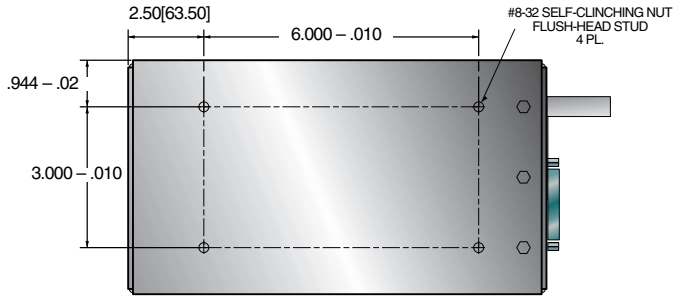


CZE2000: DIMENSIONS: in.[mm]

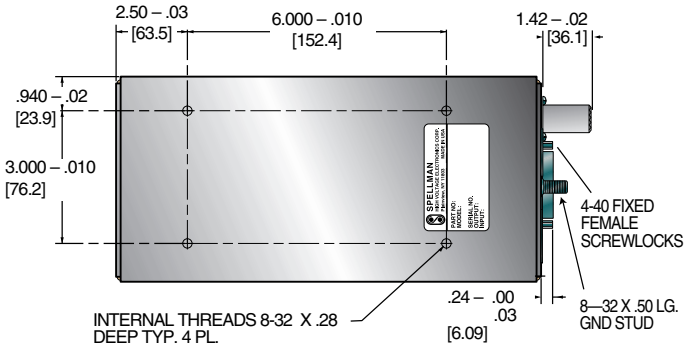
FRONT VIEW



TOP VIEW



BOTTOM VIEW



89/336/EEC
73/23/EEC

E148969
CZE2000 only

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- ***BLANKING***
- ***THERMAL SHUT DOWN***
- ***CURRENT LIMITS***
- ***ARC PROTECTION***
- ***OEM CUSTOMIZATION AVAILABLE***

Spellman High Voltage Electronics Corporation continues to set the standards for high voltage power conversion technology with the new DGM high voltage power supply for Image Intensifier applications.

The DGM was developed in conjunction with a leading supplier of medical rediagnostic imaging systems.

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
Astronomical Observations
Spectrophotometry
Non Destructive X-ray Inspection
Image Intensifiers

SPECIFICATIONS

Input Voltage:
+15Vdc and -15Vdc

Input Current:
0.5A at full output.

Programmable Output Voltages:

1. **Anode Voltage**
   Output Voltage 33kV (40kV available)
   Ripple 0.03% p-p
2. **Grid 1**
   Output Voltage 15kV
   Ripple 0.045% p-p
3. **Grid 2**
   Output Voltage 1kV
   Ripple 0.1% p-p
4. **Cathode**
   Output Voltage 250V
   Ripple 0.2% p-p
5. **Pump**
   Output Voltage 2kV
   Ripple 1% p-p

Temperature:
Operating: +10°C to +50°C.

Signal Connector:
High voltage socket output connectors
Input D-type connector

Dimensions:
6.8”H x 4.68”W x 1.37”D (173mm x 119mm x 35mm).

Weight:
2.86 lb. (1.3kg).

Custom Products
Available with Multiple Anodes, Focus and Grid Outputs.
Please consult factory for custom requirements.

- ***FLOATING, PROGRAMMABLE 3KV OUTPUT***
- ***OUTPUT ISOLATED TO 16KV***
- ***WELL REGULATED, LOW RIPPLE***
- ***OUTPUT VOLTAGE MONITOR***
- ***COMPACT SHIELDED METAL ENCLOSURE***
- ***ARC AND SHORT CIRCUIT PROTECTED***

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

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

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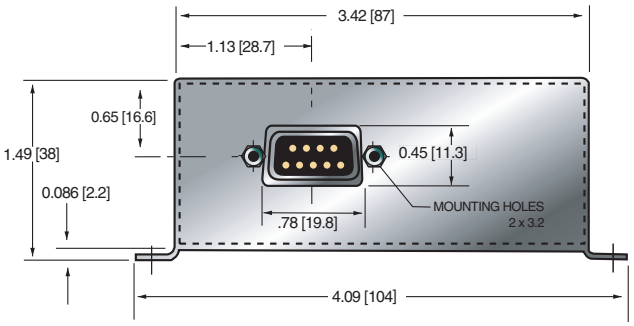
MCP INTERFACE/POWER CONNECTOR CONNECTIONS

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

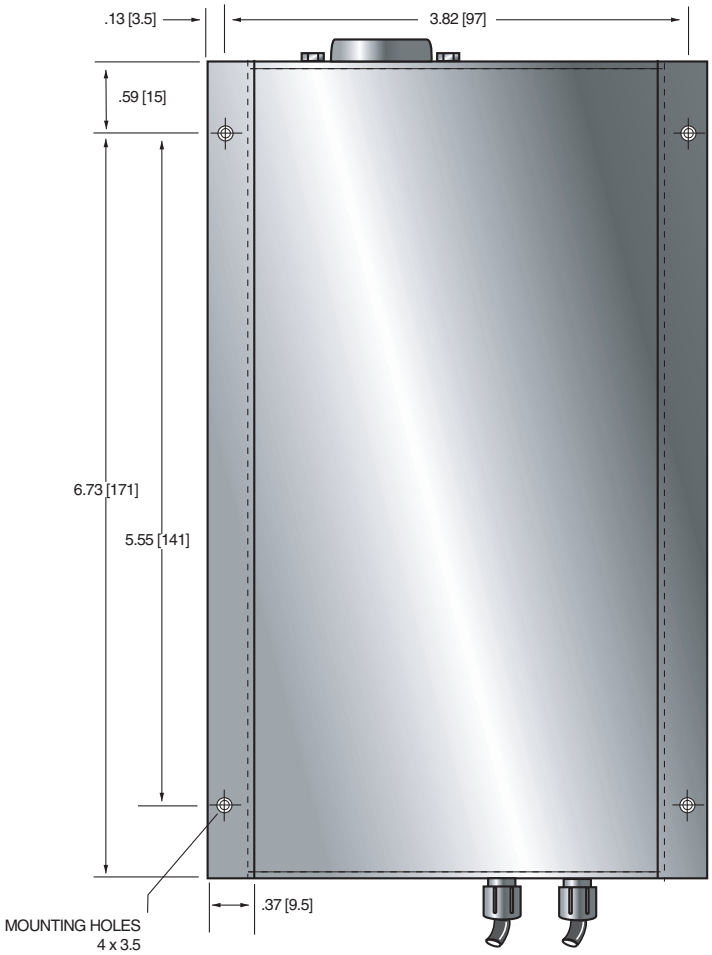
DIMENSIONS: in.[mm]

FRONT VIEW

BACK VIEW



TOP VIEW



89/336/EEC
73/23/EEC

APPLICATION SPECIFIC

- ***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***

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

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:
.98˝ H X 2.36˝ W X 2.36˝ D (25mm x 60mm x 60mm)

Weight:
3.31 oz. (94g)

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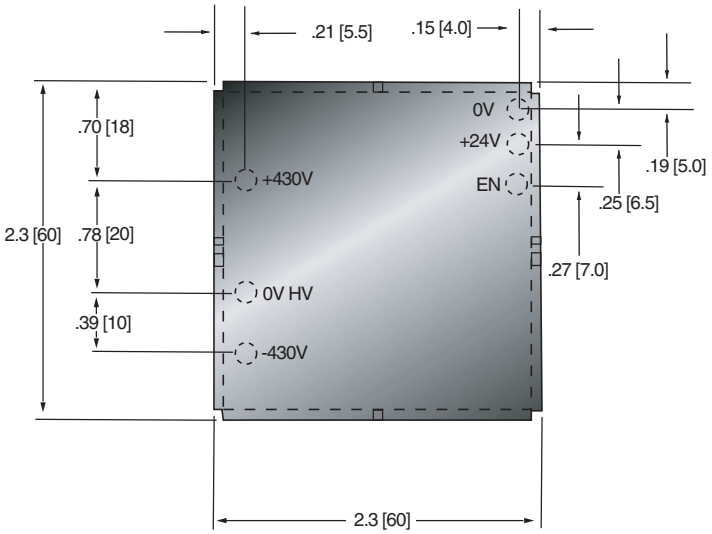
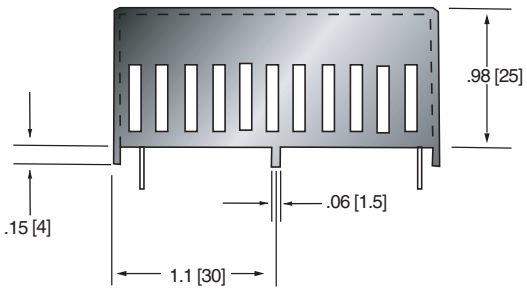
DIMENSIONS: in.[mm]

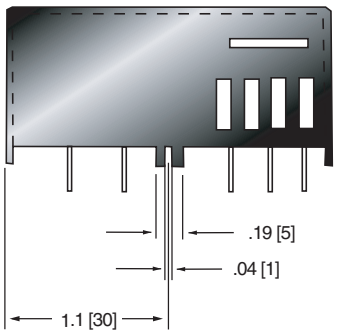
TOP VIEW



FRONT VIEW



SIDE VIEW



How to Order:
PART NO.:ML430P/N16/24

89/336/EEC
73/23/EEC

E227588

APPLICATION SPECIFIC

- ***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***

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, ±1.2Vdc

Input Current:
≤3.0 amps

Output Voltage:
Output 1-Positive:
+245 volts, fixed, accuracy <±10%
Output 2-Negative:
-245 volts, fixed, accuracy <±10%
Output 3-Positive:
+1350 volts, fixed, accuracy <±7%
Output 4-Negative:
-1350 volts, fixed, accuracy <±7%

Output Current:
15mA maximum for each output

Line Regulation: (typical)
±1 volt all outputs

Load Regulation: (typical)
±3% all outputs

Output Current Limit:
An auto-recovering short circuit fold back limit is employed. Fully arc protected, capable of 10 arcs in 5 seconds.

Ripple:
≤0.1% p-p of full rated output voltage

Stability:
≤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:
≤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:
.98˝ H X 4.33˝ W X 3.15˝ D (25mm x 110mm x 80mm)
Width does not include mounting tab

Weight:
7.27 oz. (206g)

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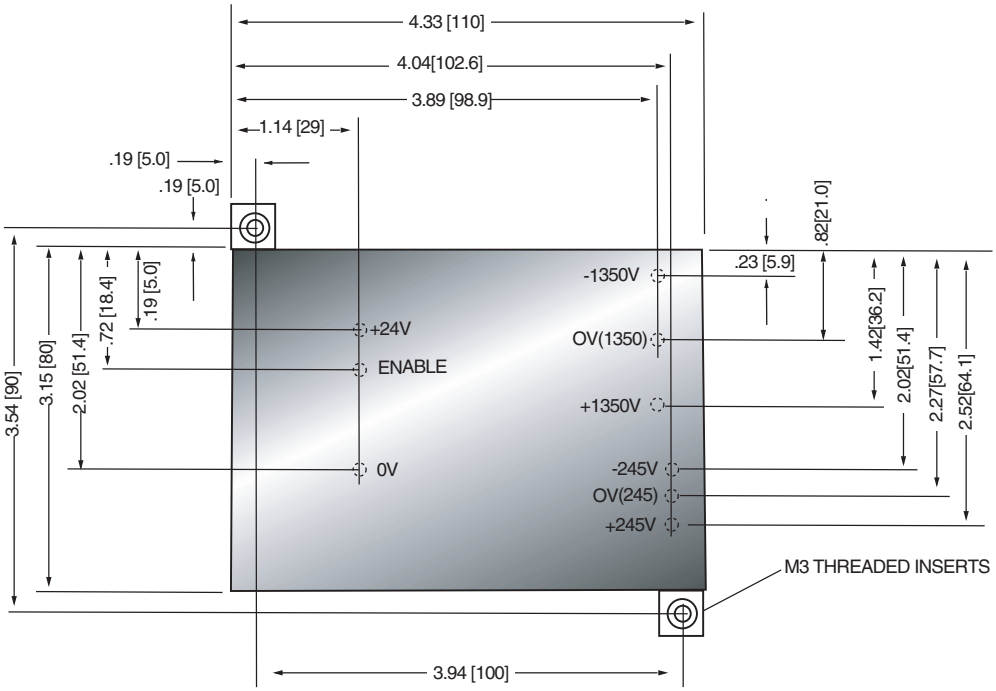
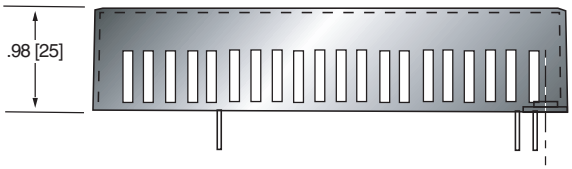
DIMENSIONS: in.[mm]

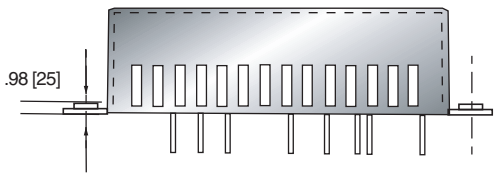
TOP VIEW



FRONT VIEW



SIDE VIEW



How to Order:
PART NO.:ML1350P/N50/24

99/336/EEC
73/23/EEC
E227588

APPLICATION SPECIFIC

- ***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***

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

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

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MX2.5 INPUT/OUTPUT CONNECTIONS

PIN NO.	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

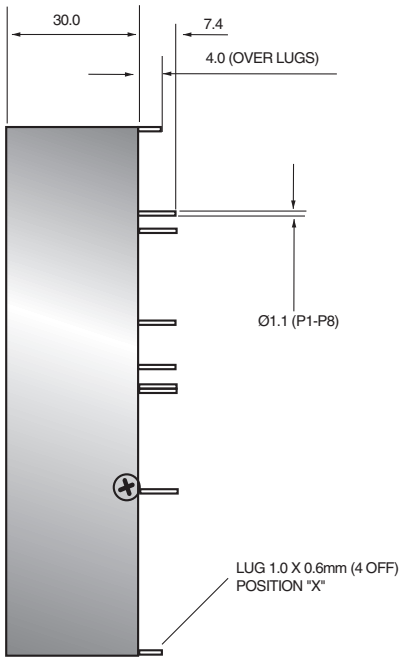
How to Order:

Standard: PART NO.:MX2.5PN24

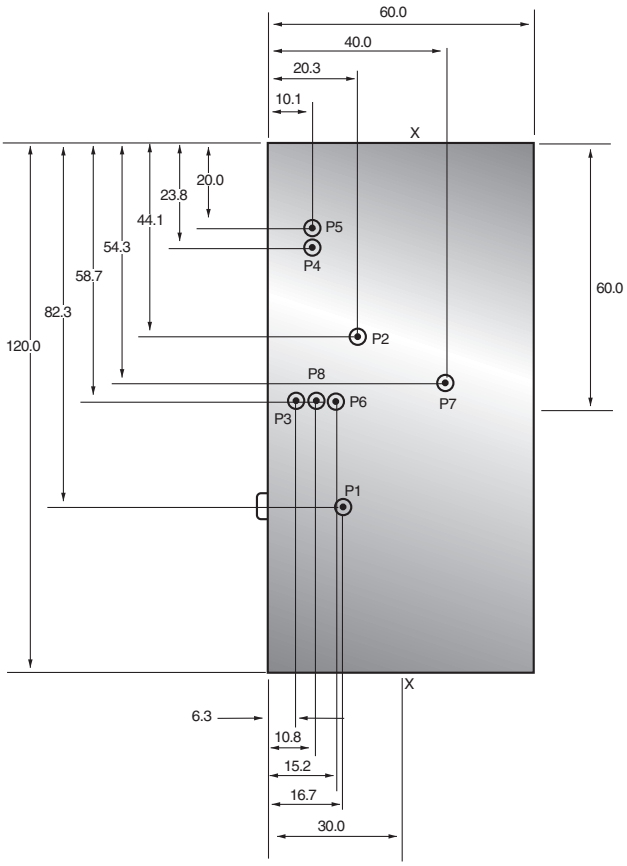
CE 89/336/EEC 73/23/EEC

DIMENSIONS: mm

SIDE VIEW



BOTTOM VIEW ON PINS



APPLICATION SPECIFIC

- ***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***

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

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

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MX10 TERMINAL BLOCK 9 PIN

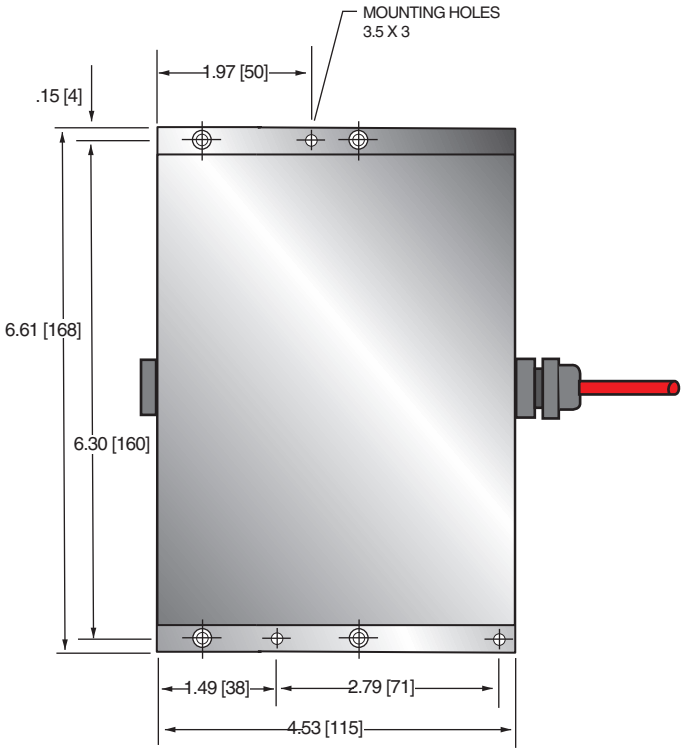
JB1	SIGNAL	SIGNAL PARAMETERS
1	Voltage Monitor	0-10V=0-100% of Rated Output
2	External Inhibit Input	Open or >10V = "OFF"; <4V = "ON"
3	Current Programming Input	0-10Vdc = 0-100% of Rated Output (on VCC option)
4	Signal Ground	Signal Ground
5	Current Monitor	0-10Vdc = 0-100% of Rated Output
6	Polarity 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
89/336/EEC
73/23/EEC

APPLICATION SPECIFIC

- ***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***

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

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

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MX20 TERMINAL BLOCK 9 PIN

JB1	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:

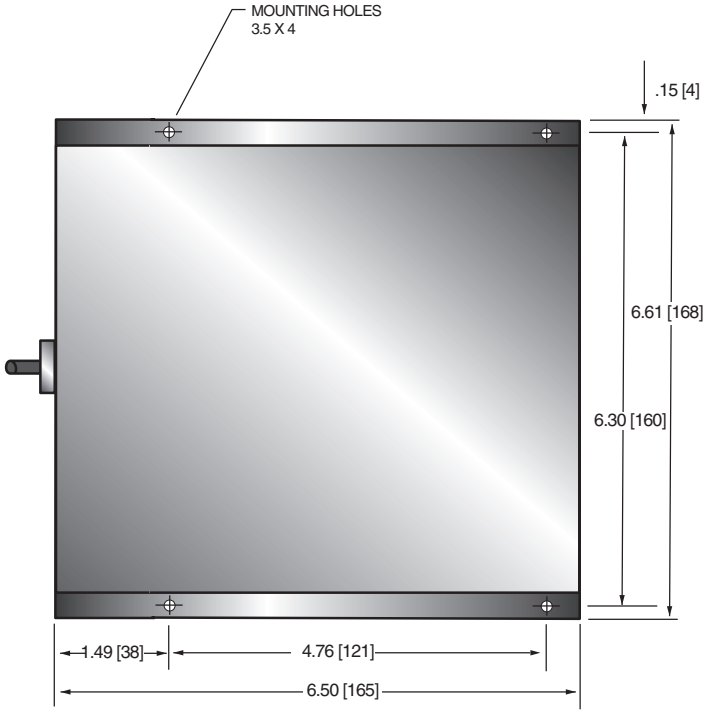
Standard: PART NO.:MX20PN24

VCC Option: PART NO.:MX20PN24/VCC

DIMENSIONS: in.[mm]

SIDE VIEW

TOP VIEW



APPLICATION SPECIFIC

CE 89/336/EEC 73/23/EEC

TOF3000 MASS SPECTROMETRY POWER SUPPLY

- ***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 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 @ 400µA 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 100µA 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:
≤70mV peak to peak

Stability:
0.01% per hour, 0.02% per 8 hours after 1.0 hour warm up period

Temperature Coefficient:
100ppm per degree C (improved capabilities upon request)

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 ±30kV, Zin ≥ 1 megohm

Program Accuracy:
±0.15% at 15KV, with overall accuracy of ±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 400uA, Zout = 4.7Kohm

Cooling:
Convection cooled

Dimensions:
3˝H X 5˝W X 12.625˝D (70.62mm 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

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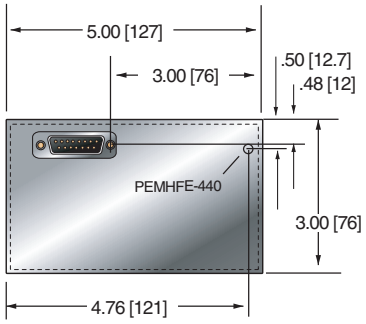
JB1 INTERFACE CONNECTOR

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

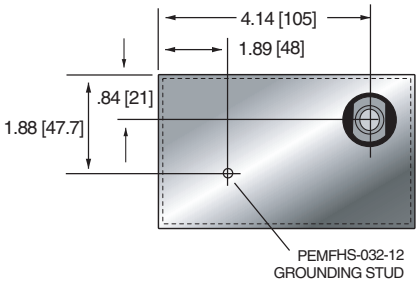
CE
89/336/EEC
73/23/EEC

DIMENSIONS: in.[mm]

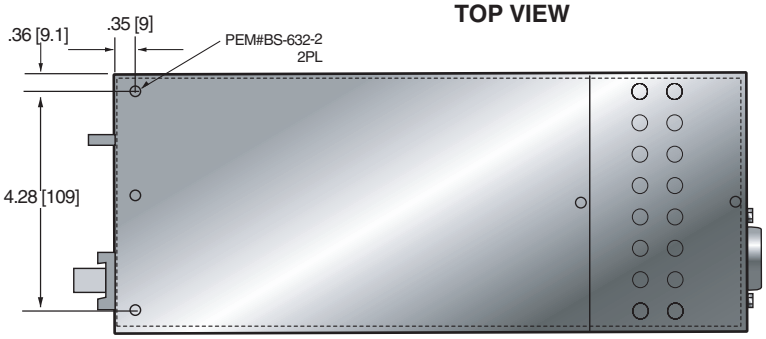
FRONT VIEW



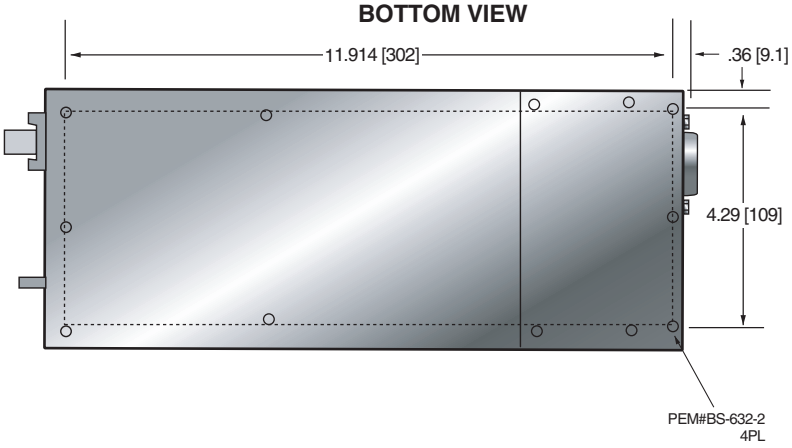
BACK VIEW



TOP VIEW



BOTTOM VIEW



APPLICATION SPECIFIC

- ***NIM CONFIGURATION***
- ***LOW RIPPLE AND NOISE***
- ***REMOTELY PROGRAMMABLE***
- ***REVERSIBLE OUTPUT POLARITY***

Spellman's Bertan brand of NIM-AC Series high voltage power supplies utilize a precision regulated linear topology, making them ideally suited for sensitive detector applications. These stable, low noise, high voltage power supplies are arc and short circuit protected for safe, reliable operation.

All units require AC input line power, either 115Vac or 220Vac and therefore can operate without a NIM bin DC power supply.

All models feature reversible polarity. The polarity switch is located either internally or on top of the unit, depending upon the model. An LED front panel polarity indicator is provided.

Programming these units can be done via the provided front panel controls.

SPECIFICATIONS

Input Voltage:

Model 353
115Vac, ±10% @ 0.25amps or 220Vac, ±10% @ 0.125 amps, 50/60 Hertz

Models 313B, 315B, 323PS and 325
115Vac, ±10% @ 1amp or 220Vac, ±10% @ 0.5 amps, 50/60 Hertz

Output Voltage:

See "model selection" table

Output Polarity:

Polarity reversal for single width Model 353 is achieved by rotating an internal polarity selector plug. Models 313B, 315B, 323PS and 325 have a screwdriver accessible switch located on the top of the unit. Polarity setting is indicated via an LED indicator on the front panel.

Output Current:

See "model selection" table

Voltage Regulation:

Line: ≤0.001% of rated output voltage over specified input voltage range

Load: ≤0.002% of rated output voltage for a full load change

Current Regulation:

Internally set to limit at less than 110% of rated current. Supply will self-restore upon removal of overload condition

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

Front Panel Features:

Metering:

Model 313B and 353 have a 0 to 3kV high voltage output meter. Meter accuracy is ±5%.

Model 323PS and 325 have a 3.5 digit digital meter for monitoring both output voltage and output current. A selector switch determines which parameter is displayed. Meter accuracy is ±0.5% + 10 V for voltage readings, and ±0.5% + 10uA for current readings.

Controls:

Calibrated, direct reading, front panel output voltage controls are provided. Models 313B, 315B and 353 employ a 500 volt/step switch and a 10 turn potentiometer. Models 323PS: 3 turns; Model 315B: 5 turns.

Remote Control:

Model 353 has provisions for remote high voltage inhibit control via an open collector or relay closure to ground applied at a rear panel BNC connecter.

Models 313B, 315B, 323PS and 325 have remote high voltage output programming capability. This is accomplished via a 0 to -5 volt (equals 0 to 100% of rated output) signal being applied at the remote interface connector. Input impedance is 10MΩ.

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Operating Temperature
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Power Input Connector:
Standard captive North American 3 conductor line cord and plug

353 Inhibit Connector:
BNC receptacle UG-290/U

313B, 315B, 323PS, 325 Programming Connector:
BNC receptacle UG-290/U

Output Connector:
SHV (Kings 1707-1 or equivalent)

Cooling:
Convection cooled

Dimensions
Single Width:
1.35˝W X 8.7˝H X 9.7˝D
(34mm X 221mm X 246mm)

Double Width:
2.7˝W X 8.7˝H X 9.7˝D
(69mm X 221mm X 246mm)

Weight:
Model 353:
4.5 lbs (2.1kg)

Models 313B, 315B, 323PS and 325:
11 lbs (5 kg)

MODEL SELECTION TABLE

Model	Width	Voltage	Current	Ripple
353	Single	0 to ±3kV	0 to 2mA	5mV
325	Double	0 to ±5kV	0 to 5mA	25mV
323PS	Double	0 to ±3kV	0 to 10mA	10mV
313B	Double	0 to ±3kV	0 to 10mA	10mV
315B	Double	0 to ±5kV	0 to 5mA	25mV

- ***NIM CONFIGURATION***
- ***LOW RIPPLE AND NOISE***
- ***REMOTELY PROGRAMMABLE***
- ***REVERSIBLE OUTPUT POLARITY***

Spellman's Bertan brand of NIM-DC Series high voltage power supplies utilize a precision regulated linear topology, making them ideally suited for sensitive detector applications. Each unit is a single width standard NIM module. These stable, low noise, high voltage power supplies are arc and short circuit protected for safe, reliable operation.

All units require ±24Vdc and ±12Vdc as provided by a standard NIM bin, or the MINI-BIN, model number BIN-6DC.

All models feature reversible polarity, the internal polarity switch is easily accessible. An LED front panel polarity indicator is provided.

Programming these units can be done via the provided front panel controls.

SPECIFICATIONS

Input Voltage:

Model 342A
±24Vdc ±1%, @ 83mA; ±12Vdc ±1%, @ 50mA

Models 362 and 365
±24Vdc ±1%, @ 160mA; ±12Vdc ±1%, @ 60mA

Output Voltage:

See "model selection" table

Output Polarity:

Polarity reversal on Model 342A is achieved by rotating a single polarity selector plug located inside the unit. For dual output models 362 and 365, there are independent polarity selector plugs. Polarity setting is indicated via an LED indicator on the front panel.

Output Current:

See "model selection" table

Voltage Regulation:

Line: ≤0.001% of rated output voltage over specified input voltage range

Load: ≤0.002% of rated output voltage for a full load change

Current Regulation:

Internally set to limit at less than 110% of rated current. Supply will self-restore upon removal of overload condition

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

Front Panel Features:

Metering:

Model 342A has a 0 to 2kV high voltage output meter. Meter accuracy is ±5%.

Models 362 and 365 have two 0 to maximum output, 10 division meters to display both high voltage outputs.

Controls:

Model 342A has a 0 to 1000 volt, 10 turn precision potentiometer and a 2 step switch (500 volts/step) for setting the high voltage output.

Model 362 has a 2 turn potentiometer and counting dial for setting the high voltage output.

Model 365 has a 5 turn potentiometer and counting dial for setting the high voltage output.

ON/OFF Switch:

A front panel switch controls high voltage operation. Models 362 and 365 have two switches, for independent control of each high voltage output.

Remote Control:

Model 342A has provisions for remote high voltage inhibit control via an open collector or relay closure to ground applied at a rear panel BNC connecter or NIM power connector pin.

Models 362 and 365 have provisions for remote high voltage inhibit via an open collector or relay closure to ground applied at the remote interface connecter. Remote high voltage output programming is accomplished via a 0 to -5 volt (equals 0 to 100% of rated output) applied at the remote interface connector. Input impedance is 10MΩ.

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Operating Temperature
0°C to +50°C

Storage Temperature:
-40°C to +85°C

Humidity:
20% to 85% RH, non-condensing

Power Input Connector:
Standard NIM bin power connector

342A Inhibit Connector:
BNC receptacle UG-290/U

362, 365 Programming Connector:
Amphenol 126-220

Output Connector:
Kings 1707-1. Dual output units have 2 connectors

Cooling:
Convection cooled

Dimensions
1.35˝ W X 8.7˝ H X 9.7˝ D
(34mm X 221mm X 246mm)

Weight:
≤4 pounds (1.8kg)

MODEL SELECTION TABLE

Model	Voltage	Output Type	Current	Ripple
342A	0 to ±2kV	Single	0 to 1mA	2mV
362	0 to ±2kV	Dual	0 to 1mA	2mV
365	0 to ±5kV	Dual	0 to 0.3mA	5mV

- ***INTEGRATED POWER SUPPLY/SOCKET DESIGN***
- ***REGULATED OUTPUT***
- ***LOW RIPPLE***
- ***FULLY ENCAPSULATED***
- ***ARC/SHORT CIRCUIT PROTECTED***

Spellman's PMTS is a custom designed high voltage power supply and integrated mounting socket for standard 1.125 inch (28mm) side-on photomultiplier tubes. Ten equally divided, incremental output voltages are generated and provided via the use of a 10 stage voltage multiplier arrangement.

The output voltage is programmable over the entire rated range via a ground referenced 0 to 5Vdc signal. The stable, well regulated and low ripple outputs enhance PMT operation and performance. An internal feedback divider resistor allows output regulation, provides a bleed function while also generating a ground referenced output voltage monitoring signal.

The PMTS is fully encapsulated for optimum reliability. Isolating the high voltage circuitry from the local environment minimizes contamination concerns while enhancing user safety. The Anode current signal is provided via a length of shielded coaxial cable to preserve signal integrity. A metal installation flange is provided allowing easy mounting and installation.

SPECIFICATIONS

Input Voltage:
+15Vdc, ±5%

Input Current:
≤200mA maximum, typically 100mA

Output Voltage:
0 to 1000 volts, via 10 equally divided incremental taps

Output Polarity:
Negative, with respect to ground

Output Current:
20 microamps, maximum

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

Ripple:
≤1.0 millivolt peak to peak, photoelectron spikes excluded

Temperature Coefficient:
≤100ppm ppm/˚C

Stability:
≤0.01%/hr, after 1/2 hour warm up

Accuracy:
±2% at maximum output

Operating Temperature:
0˚C to +50˚C

Storage Temperature:
-40˚C to +85˚C

Humidity:
10% to 85% RH, non-condensing

Input Connector:
4 pin Molex, mating connecter provided

PMT Current Signal Cable:
9.25˝ (235mm) of RG174/U, terminated as required

PMT Socket:
Standard 1.125˝ (28mm) socket for side on photomultiplier tubes

Cooling:
Convection cooled

Dimensions:
1.25˝ diameter X 2.52˝ long (31.75mm X 64mm)

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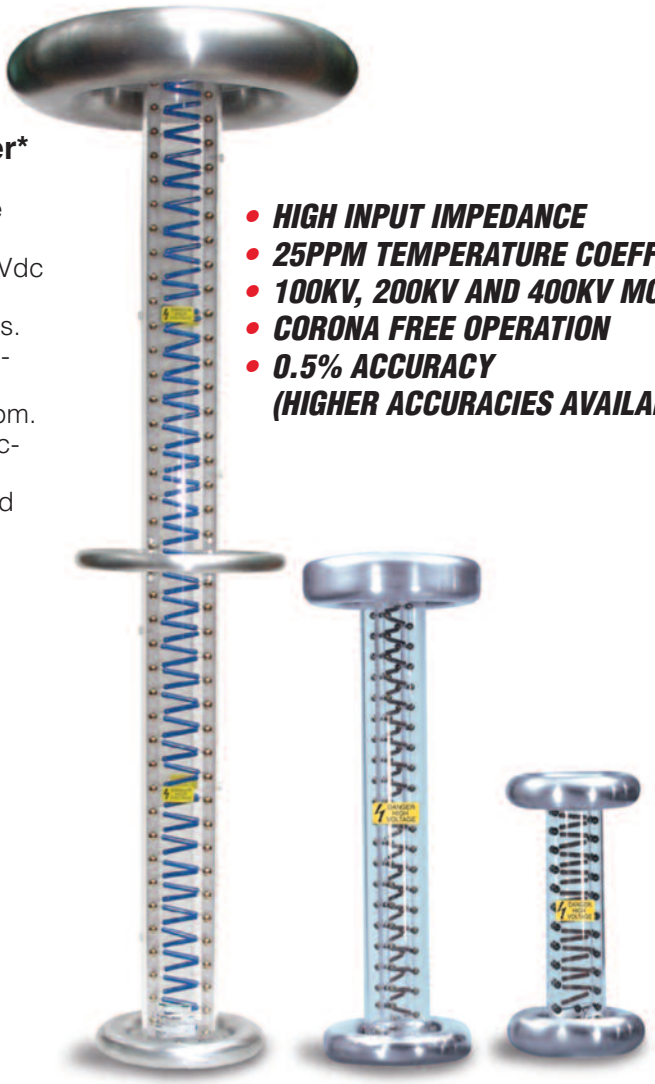
Resistive Voltage Dividers

...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 Plexiglas 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.

*Impedance of 10Gohm or higher.



- ***HIGH INPUT IMPEDANCE***
- ***25PPM TEMPERATURE COEFFICIENT***
- ***100KV, 200KV AND 400KV MODELS***
- ***CORONA FREE OPERATION***
- ***0.5% ACCURACY (HIGHER ACCURACIES AVAILABLE)***

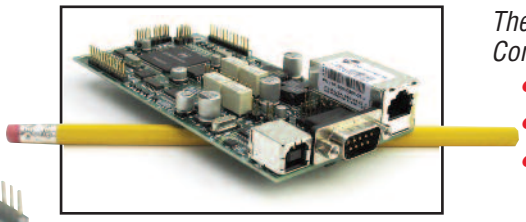
WARNING

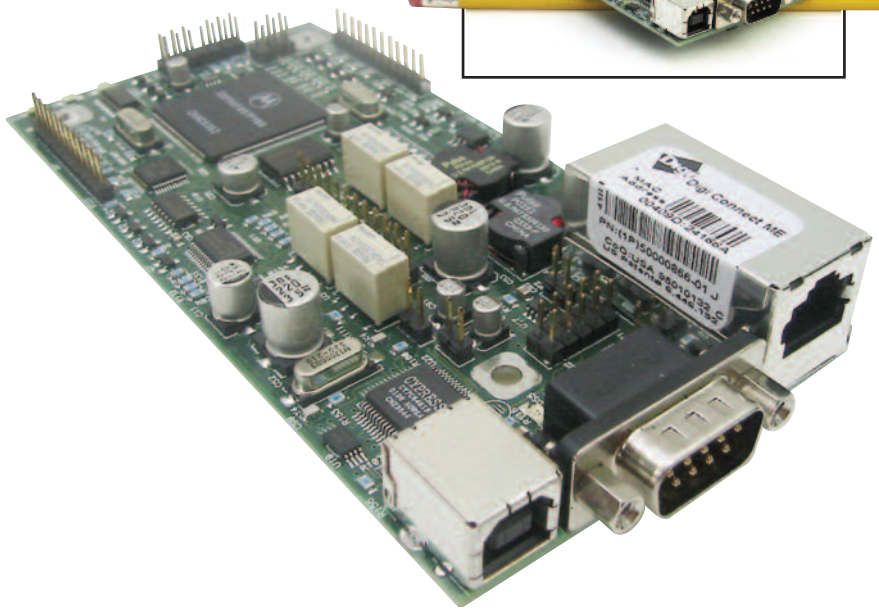
DANGEROUS LIFE THREATENING VOLTAGES MAY BE PRESENT ON THIS EQUIPMENT. OBSERVE EXTREME CAUTION WHEN OPERATING OR WORKING NEAR HIGH VOLTAGE DEVICES. NEVER TOUCH ANY HIGH VOLTAGE ASSEMBLY THAT IS SUSPECTED TO BE ENERGIZED OR CHARGED. DO NOT HANDLE OR COME WITHIN THE PROXIMITY OF HIGH VOLTAGE CONNECTIONS UNTIL ALL EQUIPMENT IS TURNED OFF AND THE SETUPS CAPACITANCE IS DISCHARGED. FAILURE TO FOLLOW SAFETY PROCEDURES MAY BE FATAL.

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





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***

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.

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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.

Diagnostic Web Server

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.

ACCESSORIES

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?

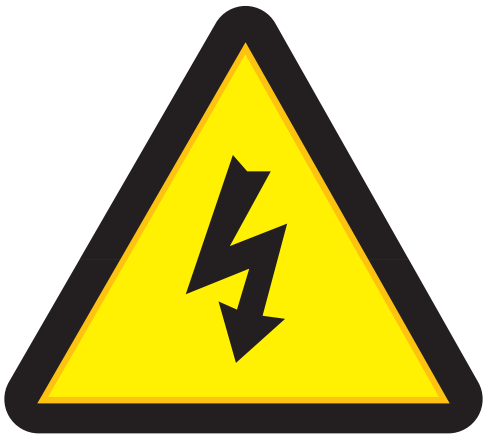
A: There are parts of the supply that are safe to touch; refer to the instructions of your operations manual. Typically the chassis of the power supply is safe to touch along with all operator controls and most interface connectors. Some other connectors could have line voltage or other potentially hazardous 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: http://www.spellmanhv.com/tech/article_detail.asp?id=1



SPELLMAN GLOBAL INFRASTRUCTURE

GLOBAL FACILITIES

Global Headquarters, Hauppauge, NY USA
100,000-square-foot facility, including design, manufacturing and corporate management.

Pullborough, UK
20,000-square-foot facility dedicated to design, manufacturing, sales and service.

Bohemia, NY USA
30,000-square-foot facility, dedicated to metal fabrication and electronic assembly.

Valhalla, NY USA
35,000-square-foot facility dedicated to design, manufacturing, sales and service.

Matamoros, Mexico
88,000-square-foot manufacturing center, mirroring our New York headquarters in capital equipment and production process technologies.

Tokyo, Japan
7,000-square-foot facility dedicated to sales and service.

Suzhou, China
17,000-square-foot facility dedicated to manufacturing, sales and service.

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