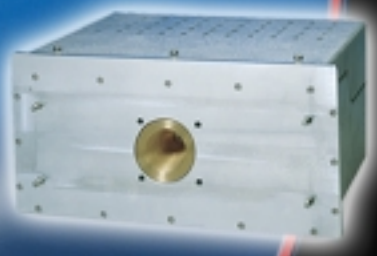
Spellman®

High Voltage Electronics Corporation

The Power of Innovation



HIGH VOLTAGE POWER SUPPLIY CATALOG

INDEX

HV PRODUCT SELECTION GUIDE

RACK MOUNT

Power	Model	Maximum Voltage (kV)
		≤0.5 1 1.5 2 2.5 3 4 5 6 8 10 12 15 20 25 30 35 40 50 60 65 70 80 100 120 130 160 200 220 260 300 360
6kW-36kW	SR	● ●
4kW-12kW	SA	● ●
2kW	SLS	● ● ● ● ● ● ●
10W-1.2kW	SL	● ●

MODULES

Power	Model	Maximum Voltage (kV)
		≤0.5 1 1.5 2 2.5 3 4 5 6 8 10 12 15 20 25 30 35 40 50 60 65 70 80 100 120 130 160 200 220 260 300 360
200W, 350W	PTV	● ●
120W	PCM	● ●
60W	SMS	● ●
30W	EPM	● ●
10W	MPS	● ●
10W	MP	● ●
3W	MS	● ●
1.5W, 2.5W	MM	● ●
1.5W	MD	● ●
200mW	MC	● ●

X-RAY

Power	Model	Maximum Voltage (kV)
		≤0.5 1 1.5 2 2.5 3 4 5 6 8 10 12 15 20 25 30 35 40 50 60 65 70 80 100 120 130 160 200 220 260 300 360
3kW, 4kW	DF/FF	● ●
600W, 1.2kW	XLF	● ●
80W, 320W, 640W	XRF	●
3W-260W	XLG	● ●
50W	MNX	●
50W	XRM	● ●

CUSTOM APPLICATIONS

Spellman High Voltage specializes in the design and manufacture of custom high voltage power supplies for the oem user. Following is an application specific overview of some of our ever expanding line of custom products. Contact sales@spellmanhv for more information.

Application	Model
Custom Laser	CO2 Laser
E Beam/I Beam	EGM
	EBM
	FIB
Electrophoresis	CZE
Electrostatic Chuck	ESC
Image Intensifier	DGM
Oil Well Data Logging	OWD

Application	Model
Magnetron	MG
Mass Spectrometry	MX10
	Electrospray
	MCP
	TOF3000
Spectroscopy	NICP
X-Ray C-Arm	C-Arm
X-Ray CT	Ultra Fast CT
	CT Scanner

Application	Model
X-Ray Microfocus	MF
X-ray Inspection	Monoblock®
X-Ray Tube Test	XRT
High Voltage Dividers	HVD

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SR6 6kW to 36kW POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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 for full load change.
Line: ±0.005% of full voltage 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 for three phase models only.
0.1% rms 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:
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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128010-001 REV.B

SR6 SELECTION TABLE

MAXIMUM RATING kV	mA	MODEL NUMBER
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.

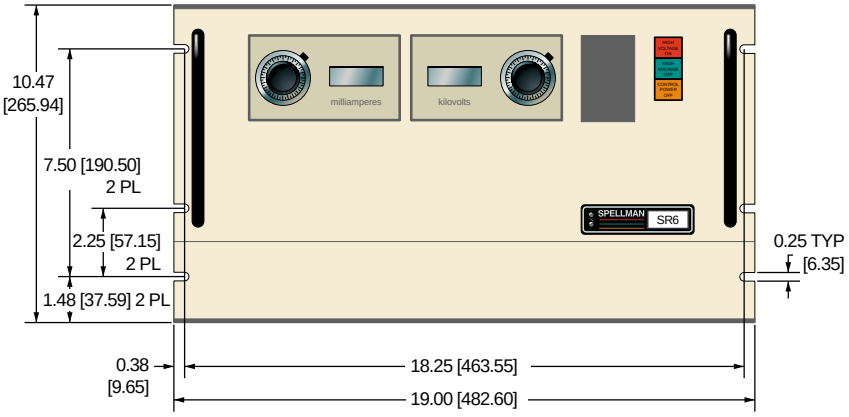
SR6 TERMINAL BLOCK 18 PIN

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	+10.3V
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

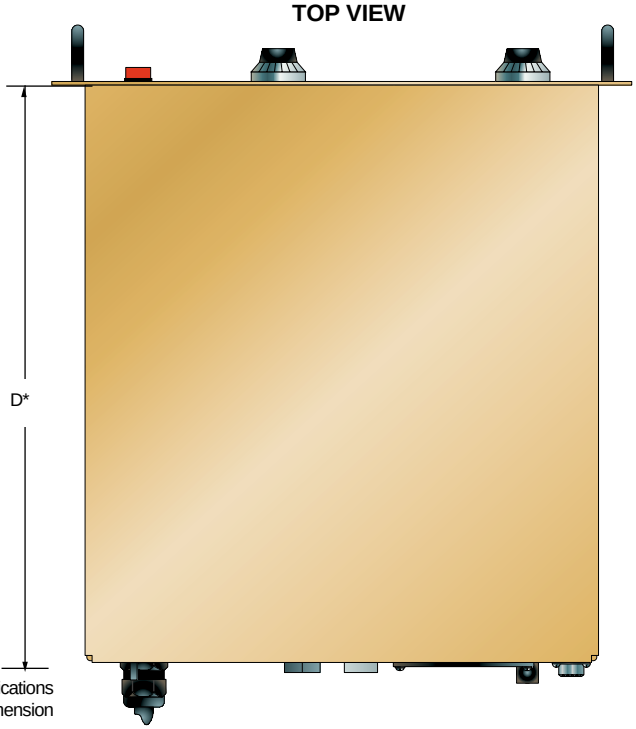
A1693 ISO 9001

DIMENSIONS: in.[mm]

FRONT VIEW

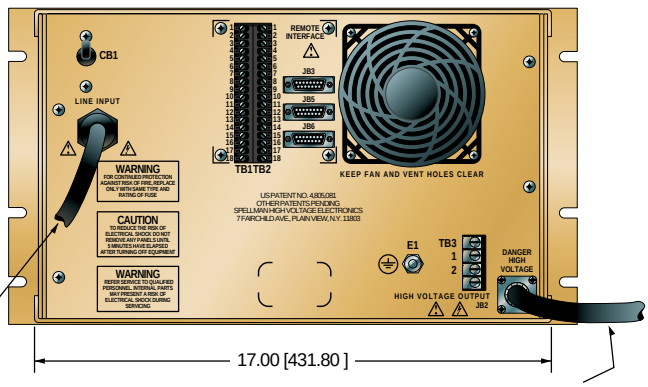


TOP VIEW



*See Specifications for Depth Dimension

BACK VIEW



6 ft OF LINE CABLE SUPPLIED WITH UNIT.

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

SA4 4kW to 12kW POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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 for full load change.
Line: ±0.005% of full voltage 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% rms for three phase models only.
0.3% rms 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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128008-001 REV.B

SA4 4kW to 12kW POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

DIMENSIONS: in.[mm]

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.

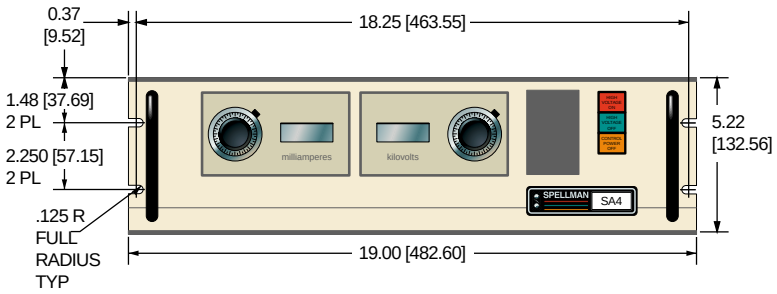
SA4 TERMINAL BLOCK 18 PIN

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	+10.3V
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

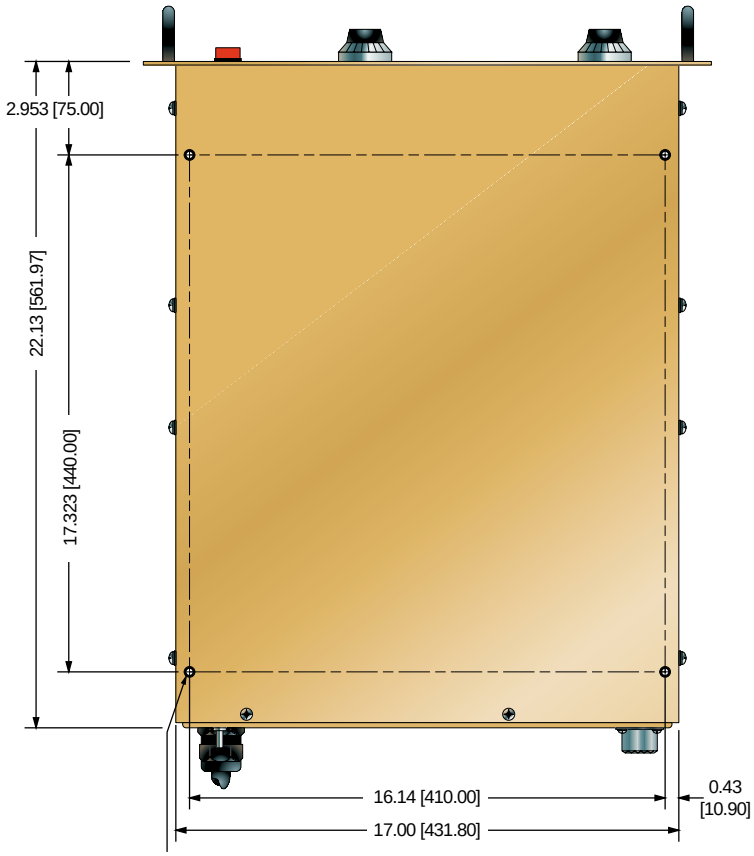
A1693 ISO 9001

RvA

FRONT VIEW

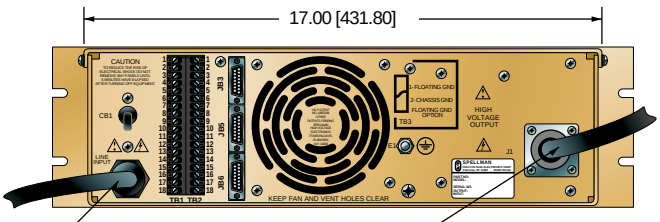


TOP VIEW



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.

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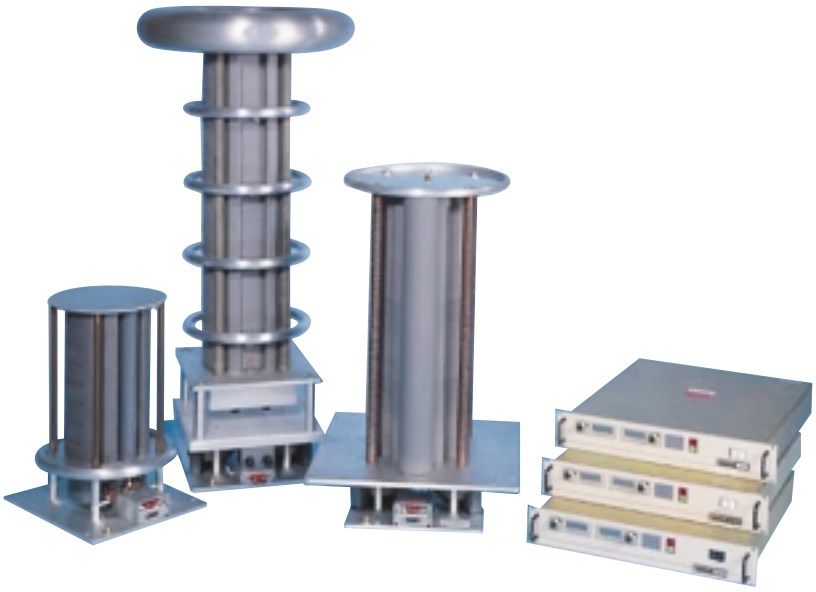
SLS 2000W POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION



- ***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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128016-001 REV.A

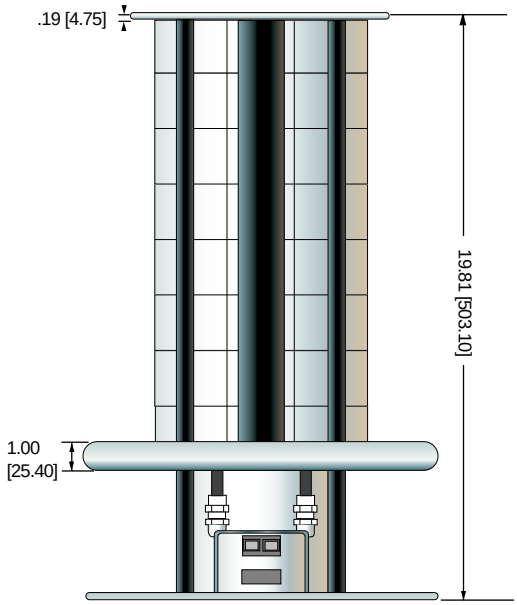
SLS SELECTION TABLE

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

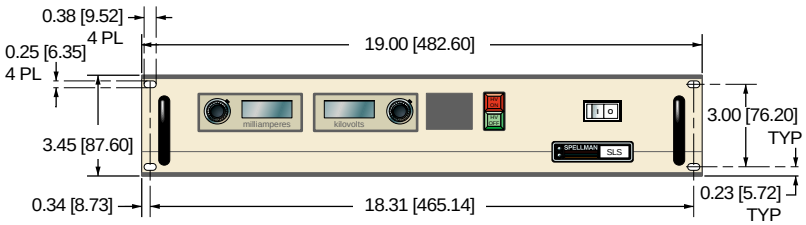
J3	SIGNAL
1	Power Supply Common
2	External Inhibit
3	External Interlock
4	External Interlock Return
5	Current Monitor
6	Voltage Monitor
7	+10V Reference
8	Remote Current Program In
9	Local Current Program Out
10	Remote Voltage Program In
11	Local Voltage Program Out
12	EFR (common)
13	EFR (normally closed)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



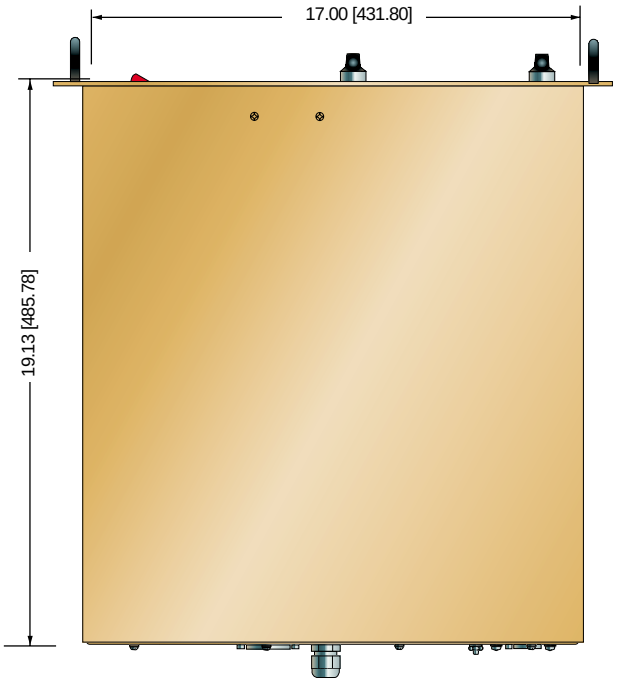
160kV Model

DIMENSIONS: in.[mm]

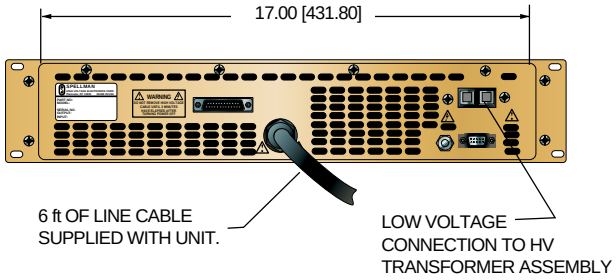
FRONT VIEW



TOP VIEW



BACK VIEW



A1693
ISO 9001
RvA
89/336/EEC
73/23/EEC

SL 10W to 1200W COMPACT HV POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

SL 10W-300W

SL 600W-1200W

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

AOL	Adjustable Overload Trip
FG	Floating Ground (15V Standard)
FGLL	Low Leakage Floating Ground, 10nA
LR	Low Ripple, .05% p-p
NSS	No Slow Start
SS(X)	Non-Standard Slow Start (std. 6 sec.)
APT	Adjustable Power Trip
CPC	Constant Power Control
SL	Mounting Slides
IO	Instant ON
PN	Reversible Polarity
EFR	External Fault Relay
ROV	Remote Over Voltage Adjust
CMS	Current Mode Select
IDR	Improved Dynamic Response
RLPS	Remote/Local Program Select
DPM4	4½ Digit Digital Panel Meter
AT	Arc Trip
BPM	Bipolar Master
BPS	Bipolar Slave
FCV	Fine Control Voltage
NAD	No Arc Detect
RFR	Remote Fault Reset

- ***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***

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 for full load change.
Line: ±0.005% of maximum voltage for a ±10% input line change.

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 of maximum output.

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

Ambient Temperature:
Operating: 0°C to 50°C.
Storage: -40°C to 85°C.

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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128009-001 REV.P

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

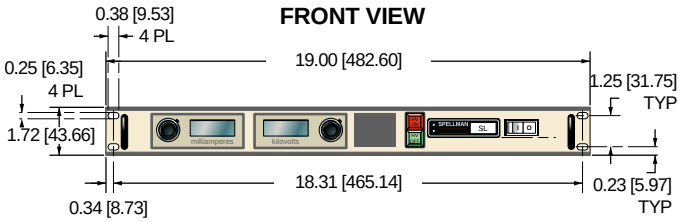
TB1	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10V Reference	+10.24V, 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

A1693 ISO 9001 RvA 89/336/EEC 73/23/EEC

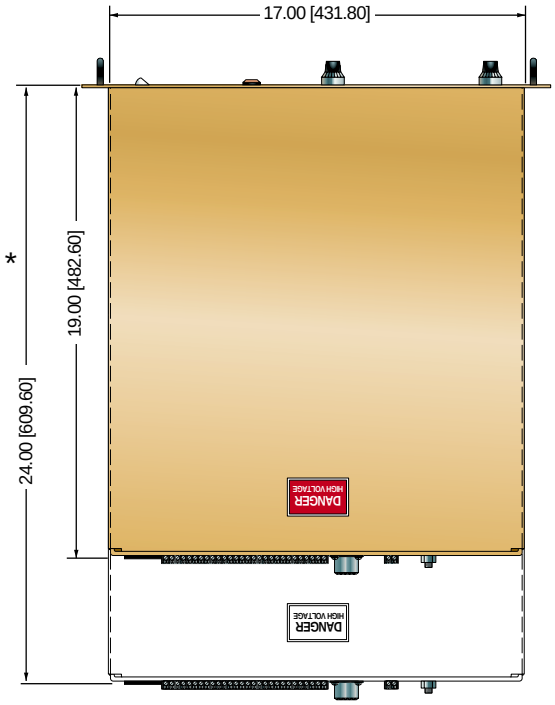
DIMENSIONS: in.[mm]

10W-300W

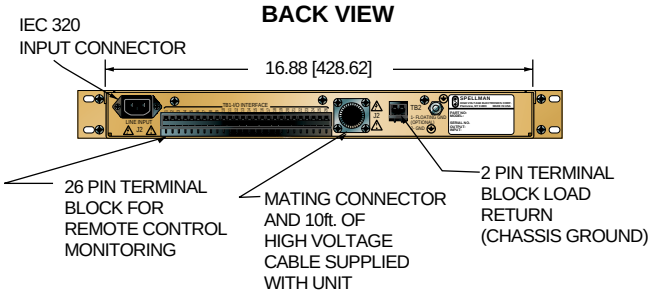
FRONT VIEW



TOP VIEW

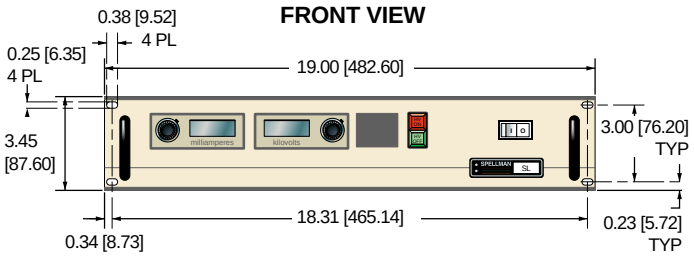


BACK VIEW

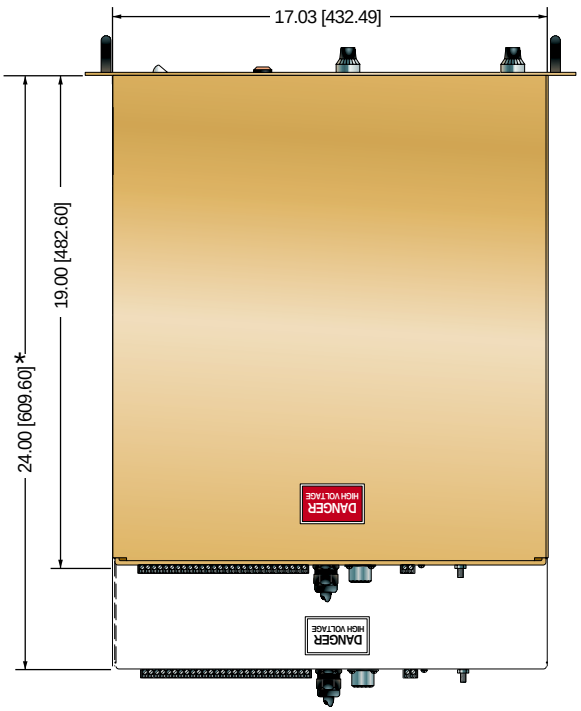


600W-1200W

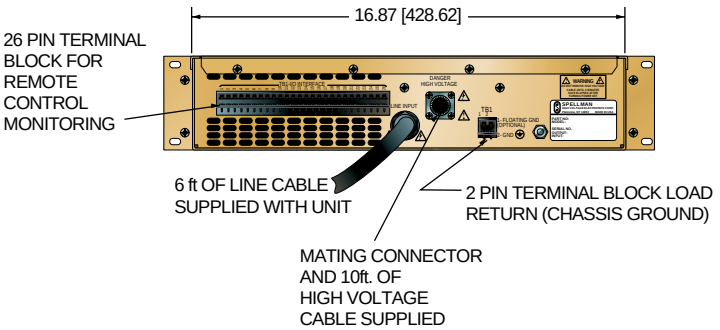
FRONT VIEW



TOP VIEW



BACK VIEW



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

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PTV 200W & 350W POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *OUTPUT VOLTAGE FROM 1KV TO 70KV*
- *OVERVOLTAGE AND SHORT-CIRCUIT PROTECTION*
- *EMI/RFI INPUT FILTER*
- *TEST POINTS FOR OUTPUT VOLTAGE AND CURRENT*
- *INTERNAL 10.24V REFERENCE*
- *OUTPUT INHIBIT CONTROL VIA TTL SIGNAL*
- *OEM CUSTOMIZATION AVAILABLE*

Spellman's PTV Series of modular high voltage power supplies deliver up to 350W of continuous power. A quasi-resonant inverter design provides over 80% efficiency with very fast dynamic response and very high peak current capability. PTV power supplies incorporate extensive standard features in two power output ranges (200W and 350W) with a wide range of output voltages operating to the most exacting specifications. An optional 600W pulse capability is available for applications requiring fast response and high peak power.

TYPICAL APPLICATIONS

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

OPTIONS

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

SPECIFICATIONS

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

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

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

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

Efficiency:
80% Typical.

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

Switching Frequency (nominal):
45-65kHz

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

Voltage Temperature Coefficient:
0.01%/°C

Stability (voltage & current):
0.01%/hr after 1/2 hour warm-up.
0.02% per 8 hours.

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

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

HV Output:
Flying lead 18"±1"(45.7cm) UL listed.
AMP LGHI connector available for 40kV only.

Power Input Connector:
IEC320.

AC Line Voltage Input Cable:
Length: 8' (2.4m).

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128007-001 REV.B

PTV SELECTION TABLE

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

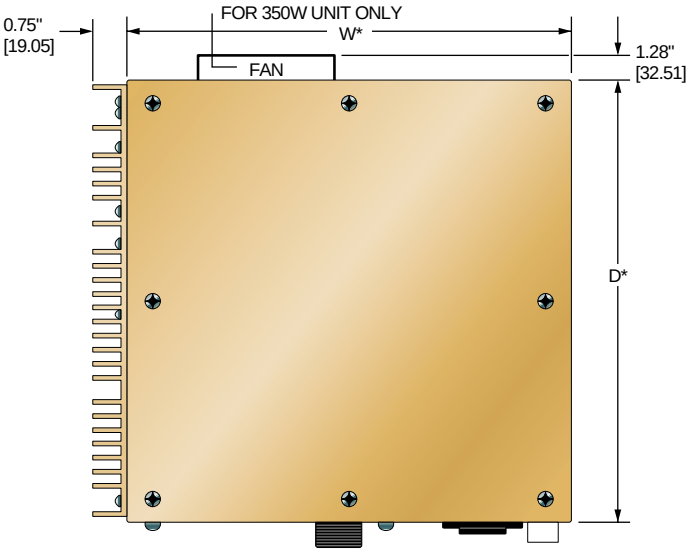
*Specify “P” for positive polarity or “N” for negative polarity.

PTV CONNECTOR 9 PIN

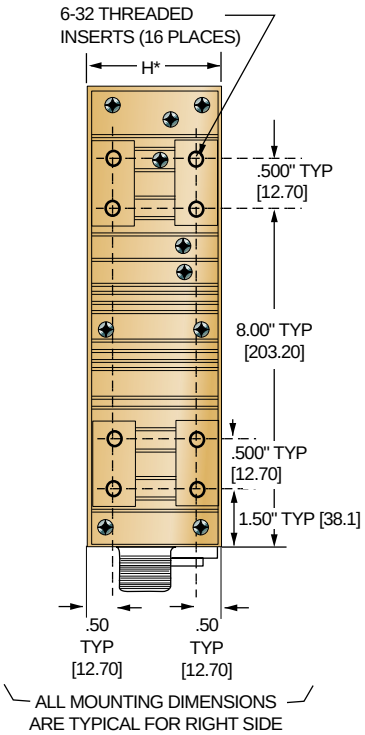
J2	SIGNAL	J2	SIGNAL
1	+10.35V	6	Current Monitor
2	Current Program	7	Enable/Inhibit
3	Voltage Monitor	8	OVP Indicator
4	Voltage Program	9	Control and Monitor Return
5	Common Ground		

DIMENSIONS: in.[mm]

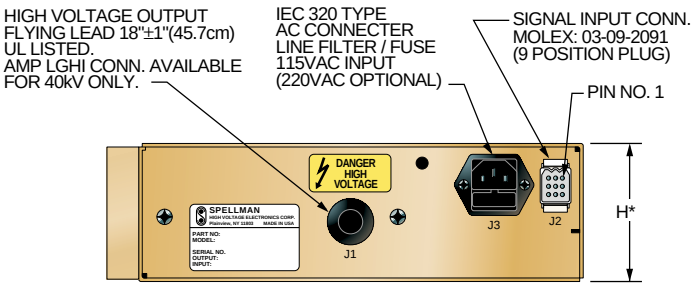
TOP VIEW



SIDE VIEW



BACK VIEW



A1693
ISO 9001
RvA
89/336/EEC
73/23/EEC
Compliant Upon
Customer Request

PCM 120W POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *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.

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			

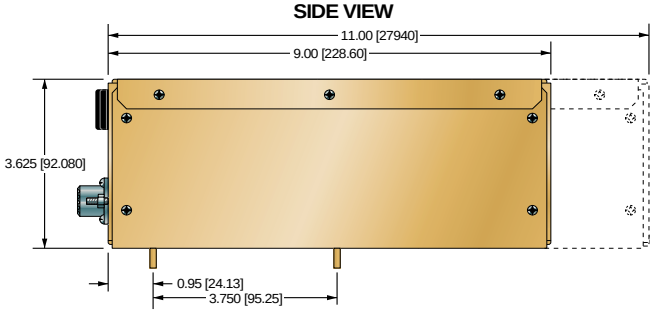
*Specify "P" for positive polarity or "N" for negative polarity.

PCM D CONNECTOR 15 PIN

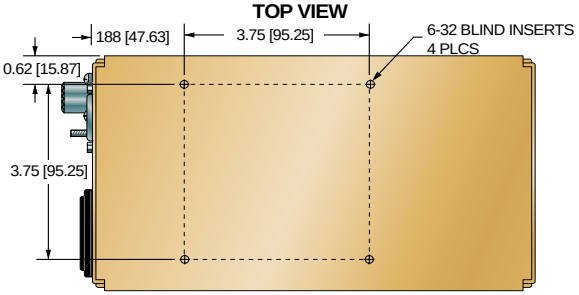
J1	SIGNAL	J1	SIGNAL
1	Remote mA Program	9	Power Supply Fault
2	Remote kV Program	10	+10V Reference
3	Enable (L)/Disable(H)	11	Signal Return
4	mA Monitor	12	Spare
5	Interlock Return	13	Spare
6	Interlock	14	Spare
7	kV Monitor	15	Local mA Program
8	Local kV Program		

DIMENSIONS: in.[mm]

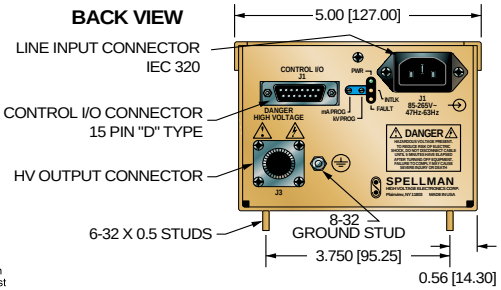
SIDE VIEW



TOP VIEW



BACK VIEW



A1693 ISO 9001

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

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128006-001 REV.B

SMS 60W POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *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. With the addition of optional circuitry, the SMS Series has the capability of delivering constant power down to 25% of the rated output voltage.

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

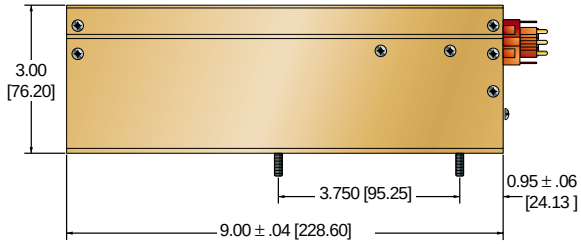
*Specify "P" for positive polarity or "N" for negative polarity.

CONNECTOR 12 PIN

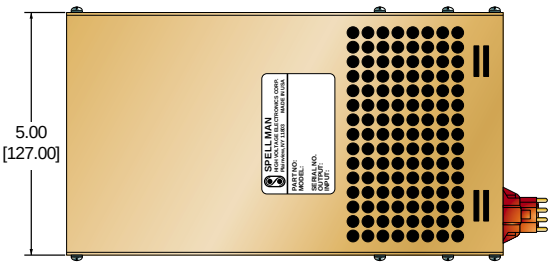
J1	SIGNAL
1	Ground
2	+28Vdc
3	High Voltage Enable/Inhibit
4	Voltage Test Point: 10V±2%=0 to Rated Output
5	Current Test Point: 10V±2%=0 to Rated Output
6	Voltage Programming
7	Current Programming
8	+10.24Vdc Reference
9	Program and Test Point Return
10-12	Spare

DIMENSIONS: in.[mm]

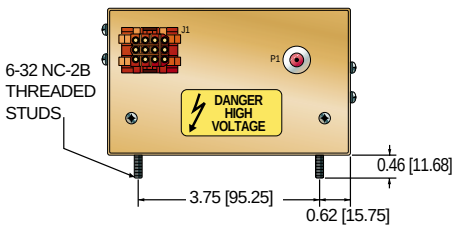
SIDE VIEW



TOP VIEW



BACK VIEW



A1693
ISO 9001
RVA
89/336/EEC
73/23/EEC

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128015-001 REV.B

EPM 30W POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *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*

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	+10.24Vdc Reference
4	Voltage Test Point	9	Program and Test Point Return
5	Current Test Point		

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.

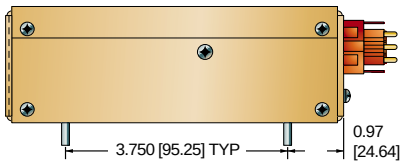
Voltage Test Point:
10V±2% = Max. rated output.

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

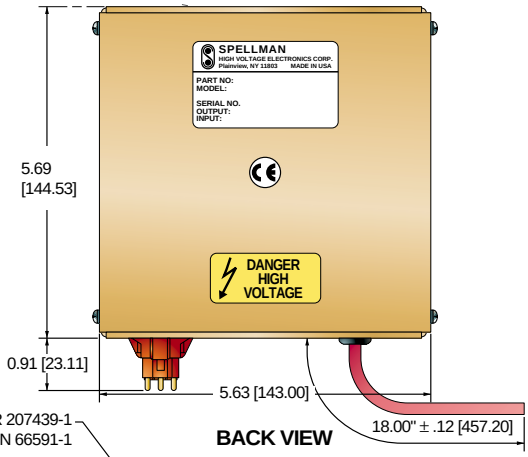
Remote Enable:
>3.4V= HV ON.
<1.0V or open= HV OFF.

DIMENSIONS: in.[mm]

SIDE VIEW

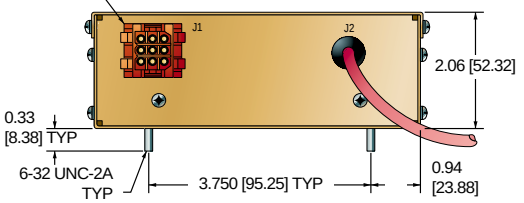


TOP VIEW



AMP CONNECTOR 207439-1
WITH MALE PIN 66591-1

BACK VIEW



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128003-001 REV.B

MP 10W HIGH STABILITY POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *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

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128005-001 REV.B

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

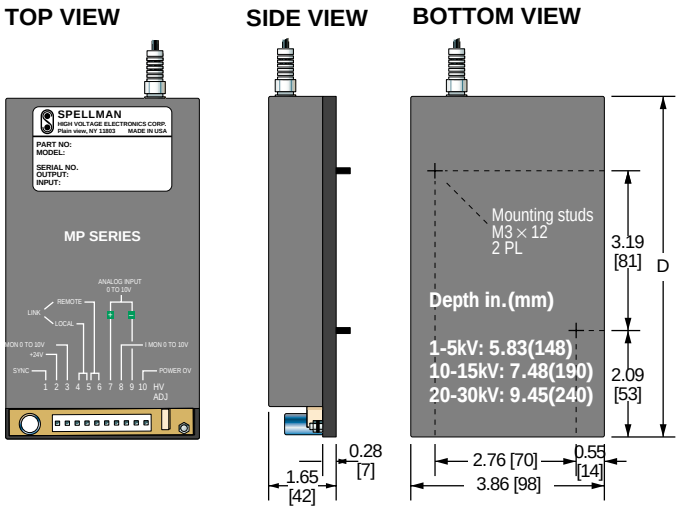
MP1 to MP5: 1.65"H x 3.86"W x 6.61" (42mm x 98mm x 168mm)
Fixing center: 6.14" (156mm)
MP10 to MP15: 1.65"H x 3.86"W x 8.27" (42mm x 98mm x 210mm)
Fixing center: 7.80" (198mm)
MP20 to MP30: 1.65"H x 3.86"W x 10.2" (42mm x 98mm x 260mm)
Fixing center: 9.77" (248mm)
MP40: 1.81"H x 3.86"W x 13.0" (46mm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

(4 x 3.3mm mounting holes))

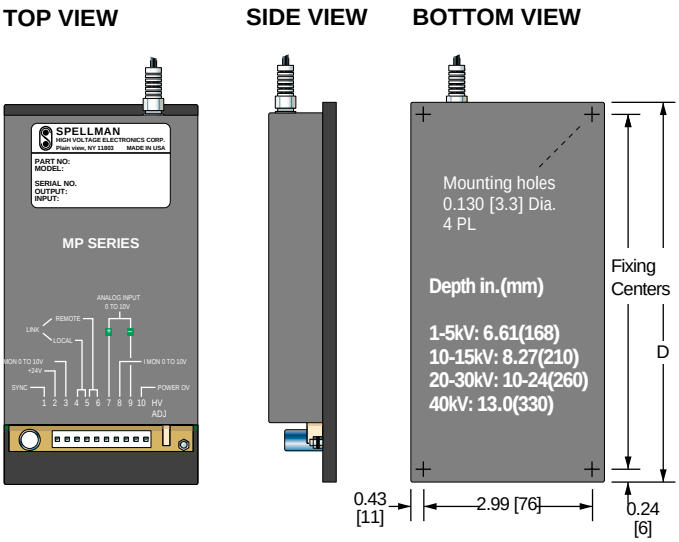
Weight:

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

A1693
ISO 9001

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MS 3W REGULATED PCB MOUNT HV POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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).

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MS SELECTION TABLE

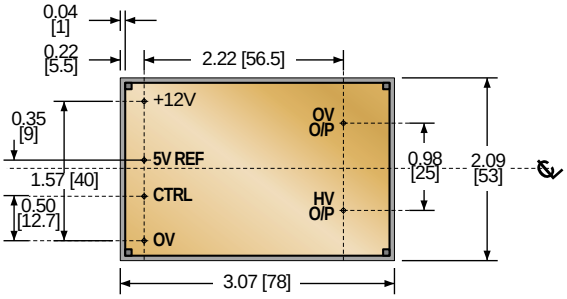
OUTPUT VOLTAGE (V)	OUTPUT CURRENT (mA)	RIPPLE V (p-p)	MODEL
300	10	0.03	MS0.3*
500	6	0.05	MS0.5*
750	4	0.075	MS0.75*
1000	3	0.10	MS1*
1500	2	0.15	MS1.5*
2000	1.5	0.20	MS2*
2500	1.2	0.25	MS2.5*
3000	1	0.30	MS3*

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

DIMENSIONS: in.[mm]

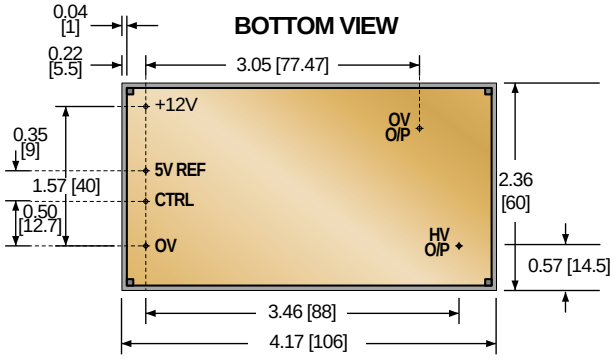
SIDE VIEW

BOTTOM VIEW



SIDE VIEW

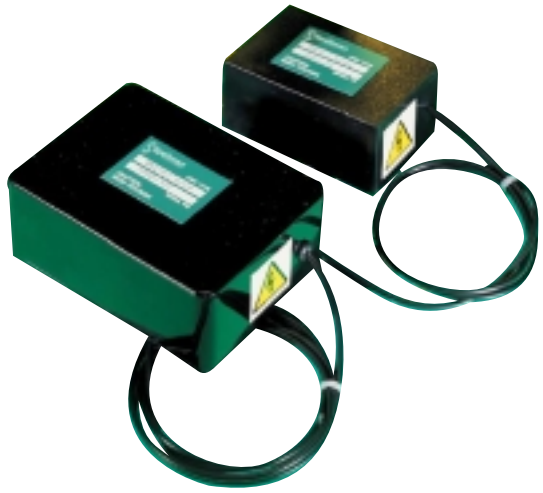
BOTTOM VIEW



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

MM 1.5W & 2.5W PCB MOUNT DC-DC CONVERTERS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION



- *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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128019-001 REV.A

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.

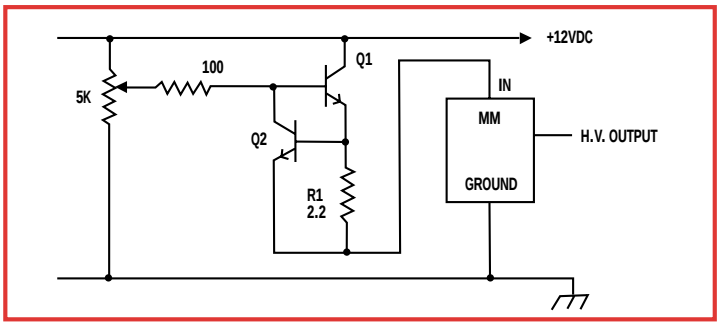
Shown here are some dc drive circuit ideas to regulate the high voltage output. It is always a good idea to incorporate current limiting as shown to allow for the occurrence of a continuous high voltage short circuit. This is sensed by R1 in the sample circuits.

NOTES

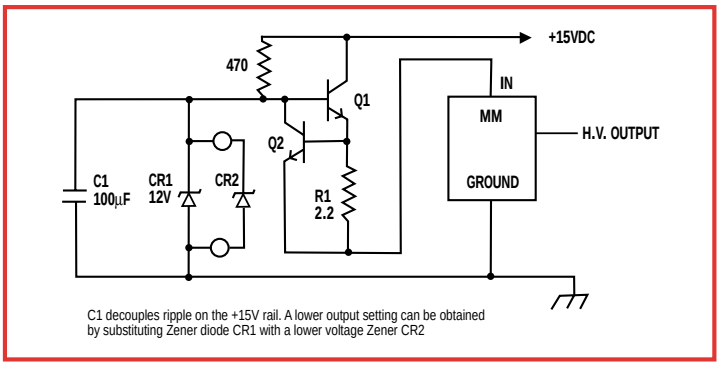
- The 1.5W MM module at full power draws a maximum of 250mA at 12V input (typically 180mA).
- The 2.5W MM module at full power draws a maximum of 380mA at 12V input (typically) 340mA).
- Output voltage is approximately proportional to the dc input voltage—allow for 1 to 2 volts drop across Q1.
- Transistor Q1 may need a heatsink
- 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.

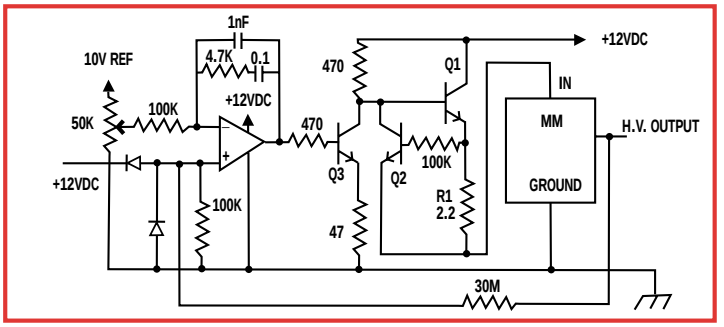


Circuit 2 This circuit is designed for fixed output voltages below the normal output voltage and has a line regulation of 5%/V (typical) change depending on the zener.

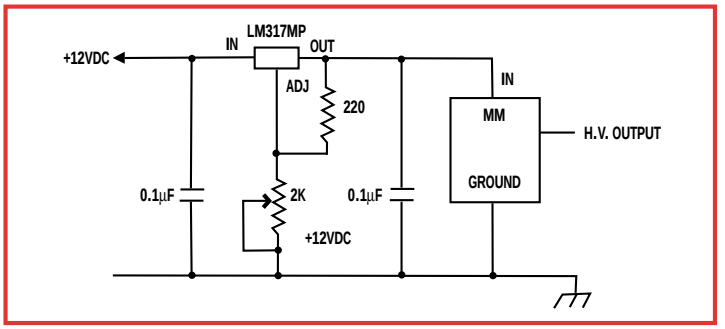


C1 decouples ripple on the +15V rail. A lower output setting can be obtained by substituting Zener diode CR1 with a lower voltage Zener CR2

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)



A1693 ISO 9001

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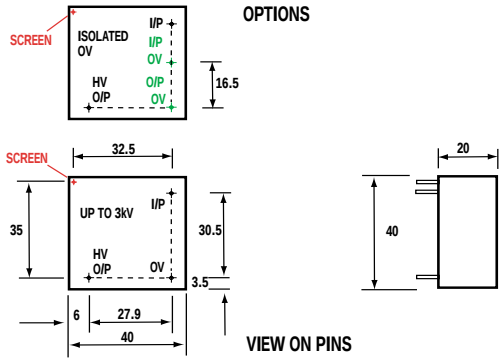
A



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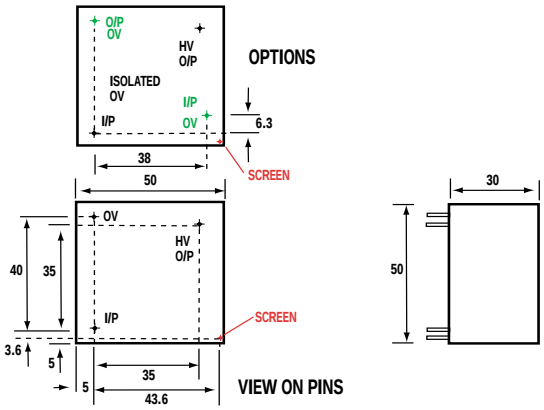

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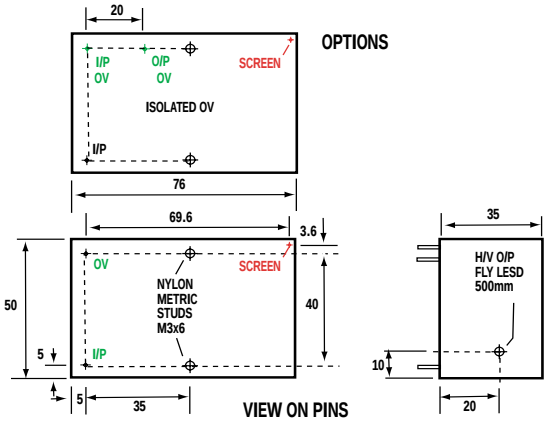

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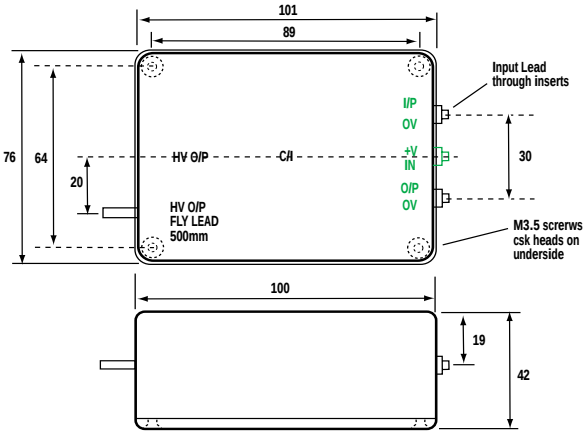

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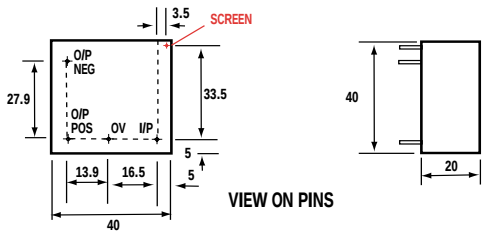

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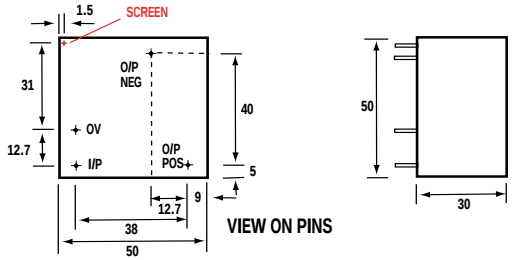

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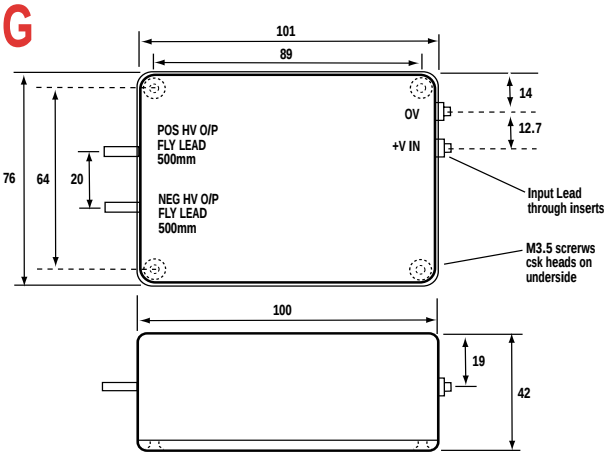

Standard configurations of housings for the MM Series modules.
Refer to case size reference in specifications on page 1.
Available options are shown in color; RED= Screen GREEN= Isolated I/P to O/P
Recommended hole size for pins- 1mm (case size A, B, E, F) 1.4mm (case size C.)

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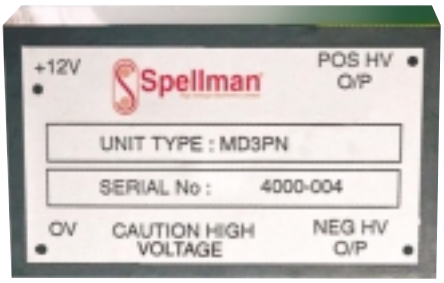
MD 1.5W PCB MOUNT DC-DC CONVERTERS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION



- *LOW COST, SMALL SIZE*
- *OUTPUT PROPORTIONAL TO INPUT*
- *HIGH INPUT/OUTPUT ISOLATION*
- *INPUT/OUTPUT FLOATING*
- *OPERATES ON ONLY 12VDC*
- *SHORT-CIRCUIT AND REVERSE POLARITY PROTECTED*
- *OEM CUSTOMIZATION AVAILABLE*

Spellman's MD Series of high voltage power supply modules are low cost, general purpose dc to dc converters designed for direct PCB mounting with output voltages to 3kV. The output voltage is proportional to the input voltage over the range of 10% to 100%. The MDA version allows a higher startup input voltage. The modules are short-circuit and reverse polarity protected. High reliability is designed into a compact and lightweight modular block intended for customer designed products at power levels of 1.5W with output voltage isolation providing reverse polarity. A shielded (screen) option is available. The modules are fully encapsulated.

TYPICAL APPLICATIONS

Photomultiplier Tubes
Precision Lenses
Image Intensifiers
Ionization Chambers
Geiger Counters
Ink Jet Printers
Gas Chromatography

SPECIFICATIONS

Input Voltage:
1.75V to 12Vdc - Model MD
5V to 12Vdc - Model MDA

Input Current:
< 200mA (typical) at full output.

Output Voltages & Currents:
Voltage ranges between 50V and 3kV are available. The output voltage is proportional to the input voltage over the range 10% to 100%.

Output Power:
1.5W maximum.

Ripple:
Less than 0.5% p-p of full output voltage.

Temperature:
Operating: 0°C to +65°C.
Storage: -35°C to +85°C.

Humidity:
0 to 90%, non-condensing.

Insulation Strength:
3kV Input/Output.

Terminations:
4 PC pins: 0.394" (1mm) diameter.

PCB plated through holes:
0.043" (1.1mm); 4 required.

Dimensions:
0.75"H x 2.5"W x 1.5"D (19mm x 63.5mm x 38.1mm).

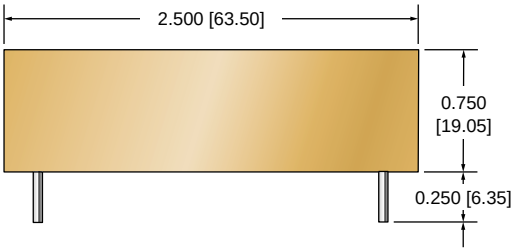
Weight:
3oz (85gm).

MD SELECTION TABLE

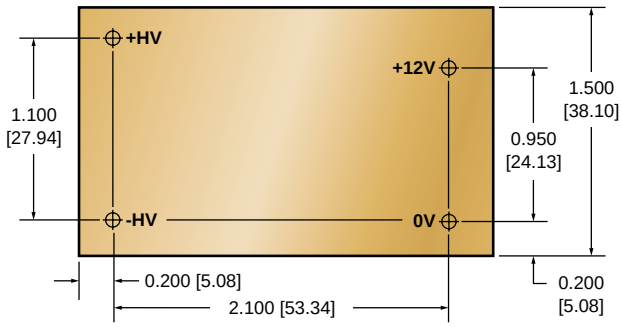
OUTPUT VOLTAGE RANGE	OUTPUT CURRENT mA max	MODEL
50 to 500	3	MD0.5PN
150 to1500	1	MD1.5PN
300 to 3000	0.5	MD3.0PN
170 to 500	3	MDA0.5PN
500 to 1500	1	MDA1.5PN
1000 to 3000	0.5	MDA3.0PN

DIMENSIONS: in.[mm]

SIDE VIEW



BOTTOM VIEW



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

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RvA

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128020-001 REV.A

MC 200mW PCB MOUNT DC-DC CONVERTERS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***LOW COST***
- ***SMALL SIZE***
- ***SHORT CIRCUIT AND REVERSE POLARITY PROTECTED***
- ***OUTPUT PROPORTIONAL TO INPUT***
- ***HIGH INPUT/OUTPUT ISOLATION***
- ***OPERATES ON ONLY 10VDC***
- ***OEM CUSTOMIZATION AVAILABLE***

Spellman's MC Series of miniature high voltage dc to dc converters are ideally suited for low power applications. They are designed for direct PCB mounting with output voltages to 2400V. All units are short-circuit protected. Input to output isolation permits positive or negative grounding for either positive or negative high voltage output. Radiated magnetic fields are minimized by winding the internal high voltage transformer on a ferrite pot core. A shielded (screen) option is available. Lower output ripple can be achieved by adding an external filter capacitor.

MC SELECTION TABLE

OUTPUT VOLTAGE (V)	OUTPUT CURRENT (µA)	MODEL
500	250	MC 0.5PN
1200	150	MC 1.2PN
2400	80	MC 2.4PN

TYPICAL APPLICATIONS

Photomultiplier Tubes
Ionization Chambers
Geiger Tubes
Medical Electronics
CRT Focus and Bias

SPECIFICATIONS

Input Voltage:
10Vdc.

Input Current:
<100mA at full output.

Output Power:
Up to 200mW continuous. See Selection Table.

Output Voltages & Currents:
Preset voltages between 500V and 2400V are available. See Selection Table.

Voltage Regulation:
Load: 5%, half load to full load.

Ripple: 0.2% p-p of full output voltage.

Switching Frequency: 100kHz typical

Insulation Strength: 3kV Input/Output.

Temperature:
Operating: 0°C to +70°C.
Storage: -45°C to +85°C.

Humidity: 0 to 90%, non-condensing.

Packaging: RTV silicone rubber

Terminations:
4 or 5 PC pins: 0.250" (6.35mm) length;
PCB plated through holes; 0.043" (1.0mm) 4 required.

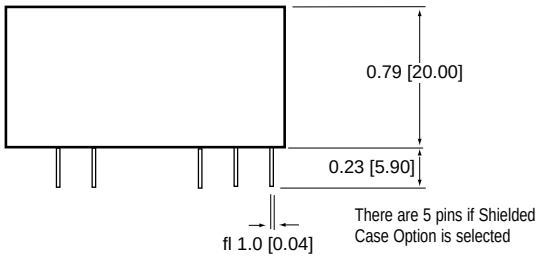
Dimensions:
0.79"H x 1.57"W x 1.57"D (20mm x 40mm x 40mm).

Weight:
1.35oz (38gm).

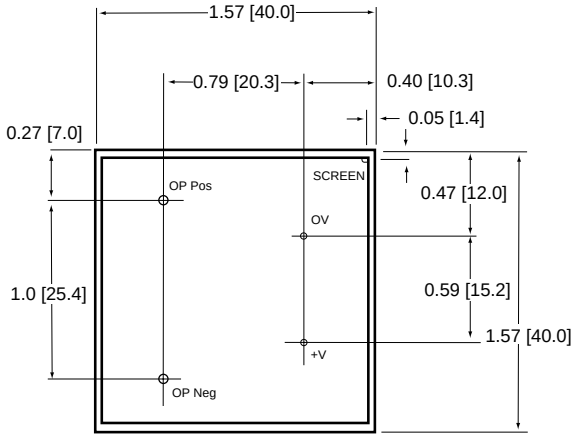
Option:
Specify/S for shielded (screened) case after the Model No.

DIMENSIONS: in.[mm]

SIDE VIEW



BOTTOM VIEW



Recommended hole size for terminals 1mm.

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

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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
22OFSI	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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128001-001 REV.B

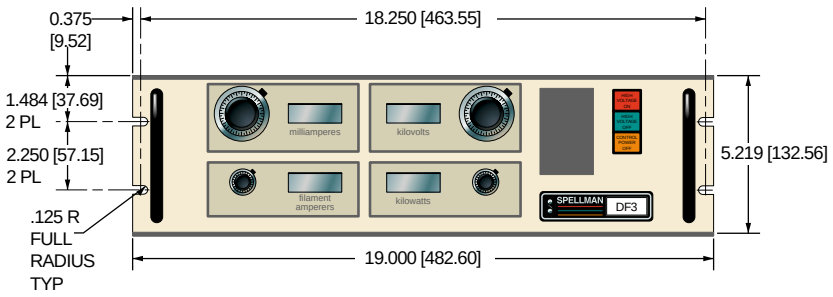
DIMENSIONS: in.[mm]

DF/FF MINI D CONNECTOR 50 PIN

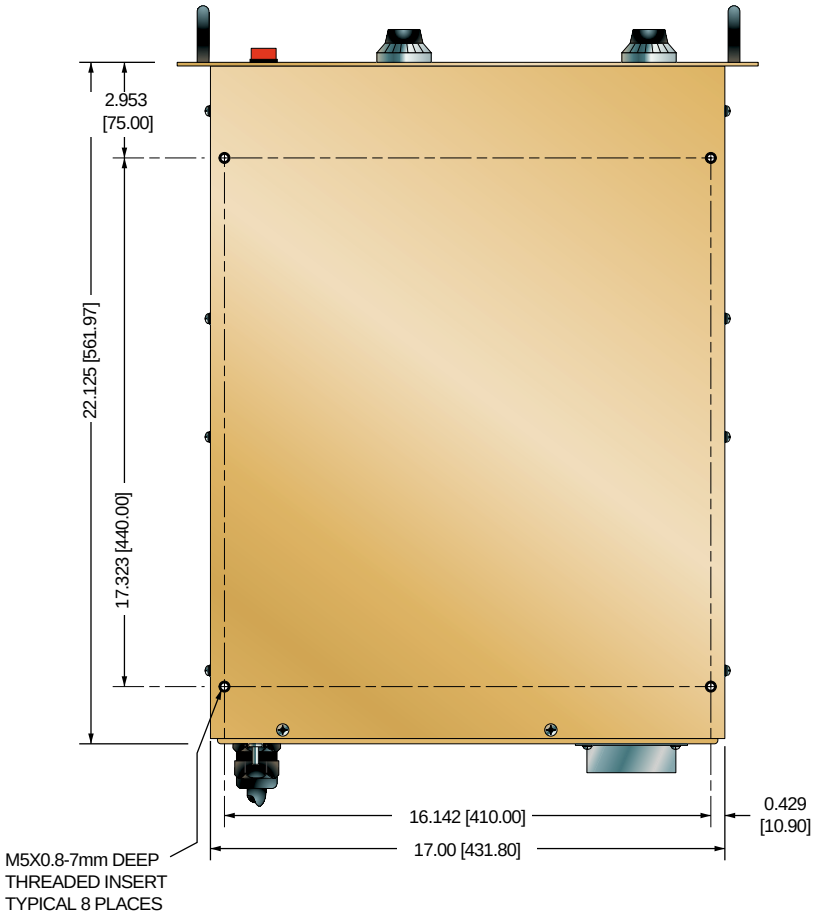
JB1	SIGNAL
1	+5Vdc (or connect to pin-11)
2	Control Power On
3	Intlk
4	X-ray On
5	X-ray Off
6	Spare
7	Spare
8	Reset
9	Rmt/Lcl
10	Spare
11	Optional Remote Power
12	X-ray On
13	Overvoltage
14	kV Min
15	Overpower
16	Filament Current Limit
17	mA Current Limit
18	Spare
19	Power Supply Fault
20	Spare
21	Spare
22	(DF) Remote X-ray On
23	(DF) Remote X-ray On
24	Spare
25	Spare
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	Spare
43	Spare
44	Spare
45	Spare
46	Filament Monitor
47	Mon Common
48	Spare
49	Spare
50	Spare

A1693 ISO 9001 RvA 89/336/EEC 73/23/EEC

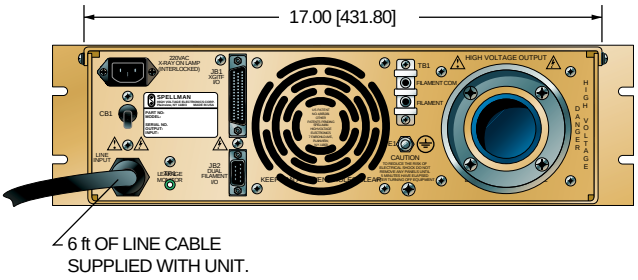
FRONT VIEW



TOP VIEW



BACK VIEW



XLF 600W, 1200W X-RAY GENERATORS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *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 19"D (8.9cm x 48.3cm x 48.3cm).

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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128011-001 REV.B

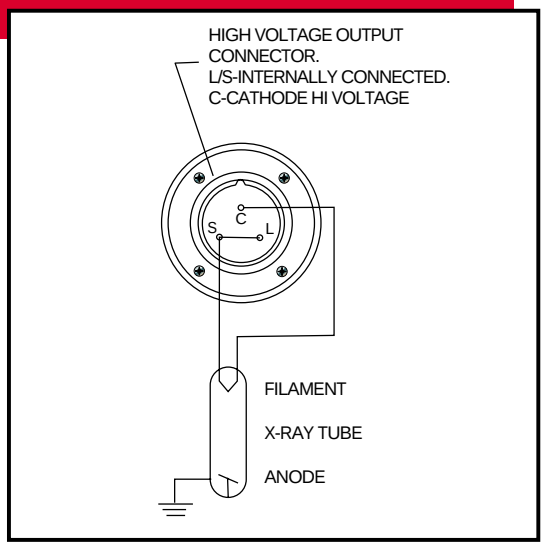
600W, 1200W XLF SELECTION TABLE

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

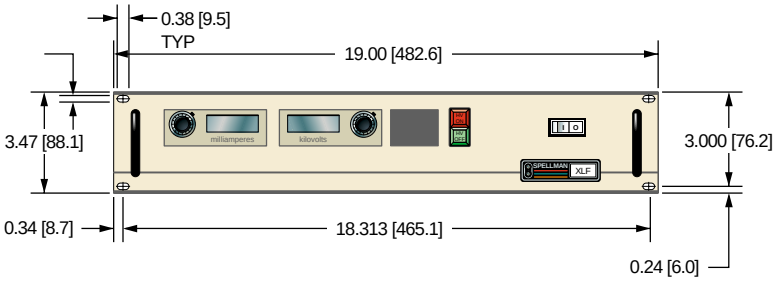
JB1	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10V Reference	+10.24V, 1mA Max
8	Remote Current Program In	0 to 10V=0 to 100% Rated Output
9	Local Current Program Out	Front Panel Program Voltage
10	Remote Voltage Program In	0 to 10V=0 to 100% Rated Output
11	Local Voltage Program Out	Front Panel Program Voltage
12	Power Monitor	0 to 10V=0 to 100% Rated Output
13	Remote Power Program In	(Optional)
14	Local HV Off Out	+15V at Open, <25mA at Closed
15	HV Off	Connect to HV OFF for Fp Operation
16	Remote HV On	+15V, 10mA Max=HV Off
17	Remote HV Off Indicator	0=HV On, +15V, 10mA Max=HV Off
18	Remote HV On Indicator	0=HV Off, +15V, 10mA Max=HV On
19	Remote Voltage Mode	
20	Remote Current Mode	Open Collector 50V Max, 10mA Max
21	Remote Power Mode	On=Active
22	Remote PS Fault	0=Fault, +15V, 0.1mA Max=No Fault
23	+15V Output	+15V, 100mA Max
24	Power Supply Common	Signal Ground
25	Shield Return	Shield Return

HIGH VOLTAGE CONNECTOR PINOUT

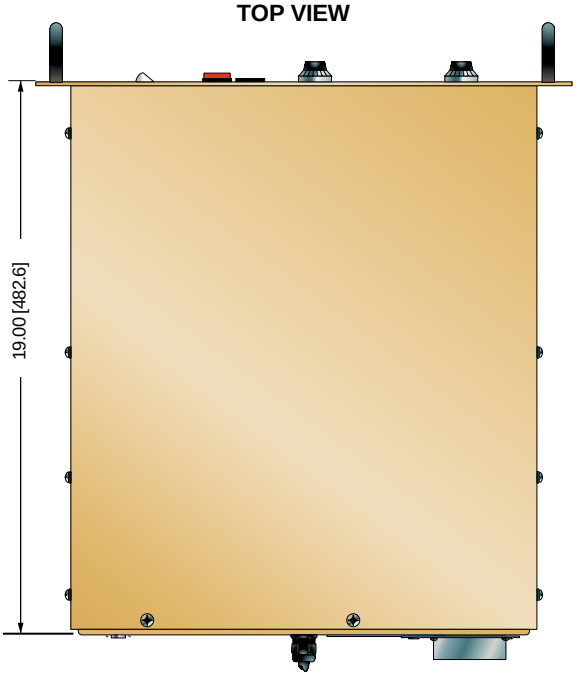


DIMENSIONS: in.[mm]

FRONT VIEW



TOP VIEW



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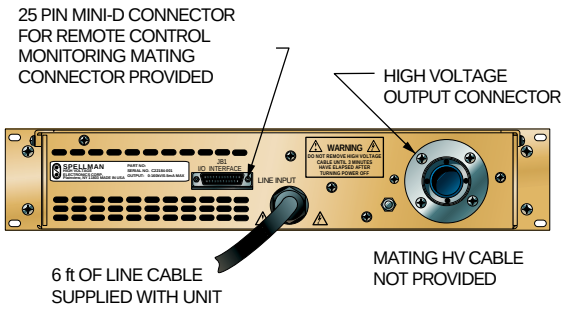

A1693 ISO 9001
89/336/EEC 73/23/EEC

XRF 80W, 320W & 640W X-RAY GENERATORS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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.

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128013-001 REV.B

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:

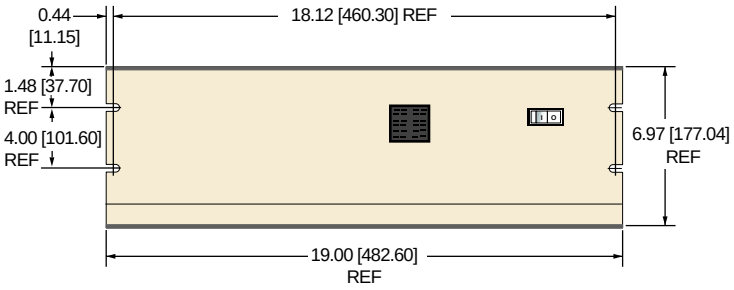
7"H x 19"W x 22"D. (17.8cm x 48.3cm x 55.9cm).

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



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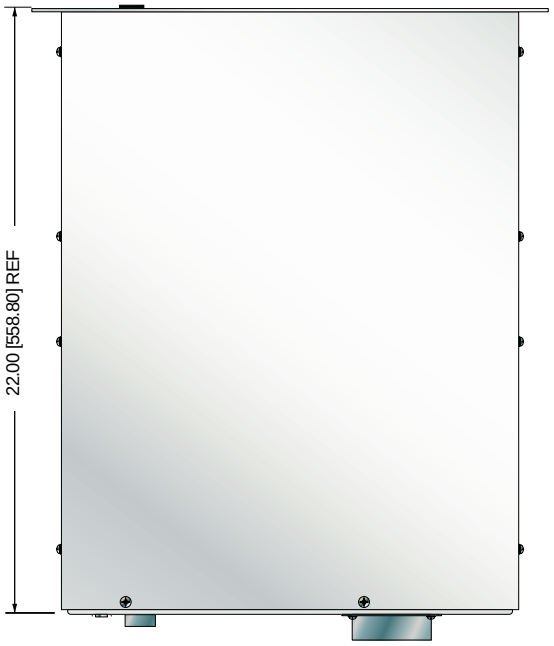

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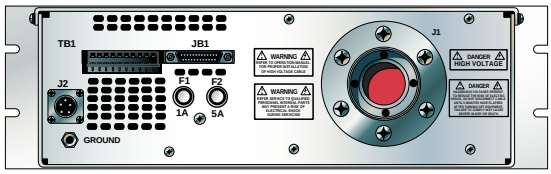

160kV XRF 80W, 320W, 640W, 25 PIN

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

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XLG 3W-260W X-RAY GENERATORS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *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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128012-001 REV.B

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*	---

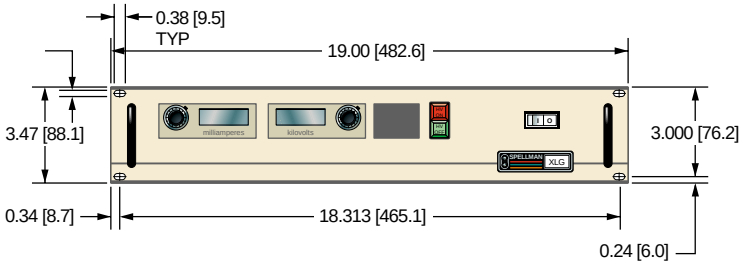
*Specify FH for High power (27W) filament, FL for Low power (9W) filament.

XLG CONNECTOR 25 PIN

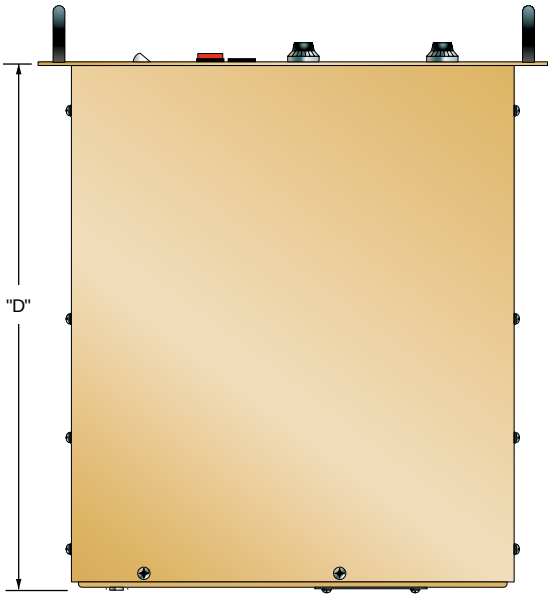
JB1	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10V Reference	+10.24V, 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

DIMENSIONS: in.[mm]

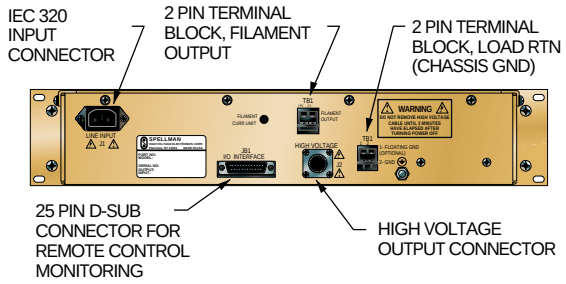
FRONT VIEW



TOP VIEW



BACK VIEW



A1693 ISO 9001 RvA 89/336/EEC 73/23/EEC

MNX 50W X-RAY POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

NEW HALF THE SIZE OF THE XRM WITH LESS RIPPLE!

- ***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 (Ethenet, 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)

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128023-001 REV.A

MNX HIGH VOLTAGE OUTPUT CONNECTOR

J1

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

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

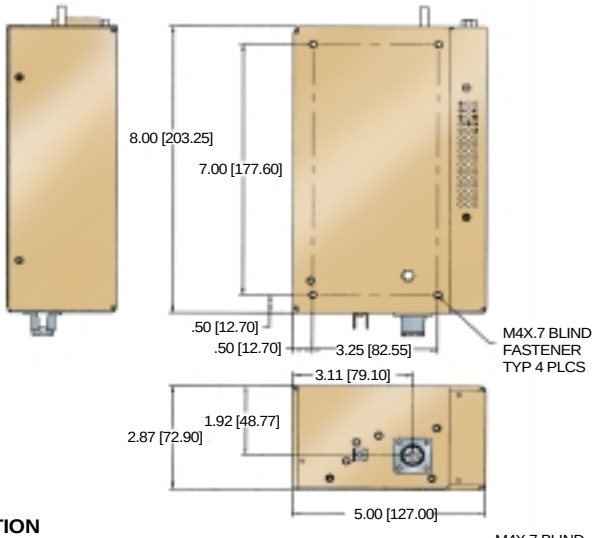
ANALOG INTERFACE CONNECTOR MALE 15 PIN MINI "D"

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

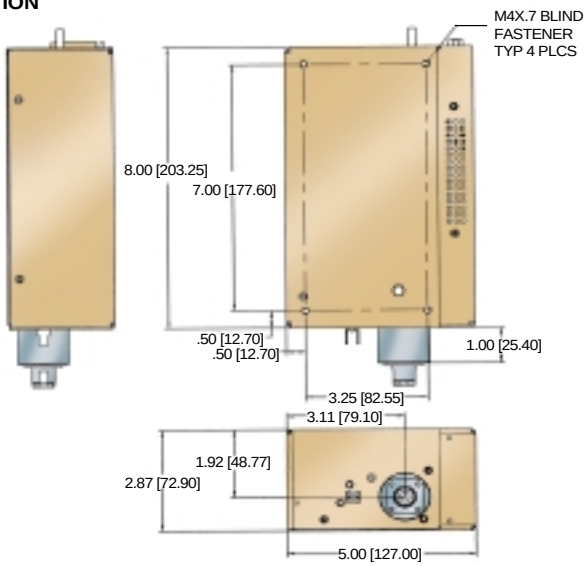
*Denotes 10 turn potentiometer located on front panel

DIMENSIONS: in.[mm]

STANDARD



XCC OPTION



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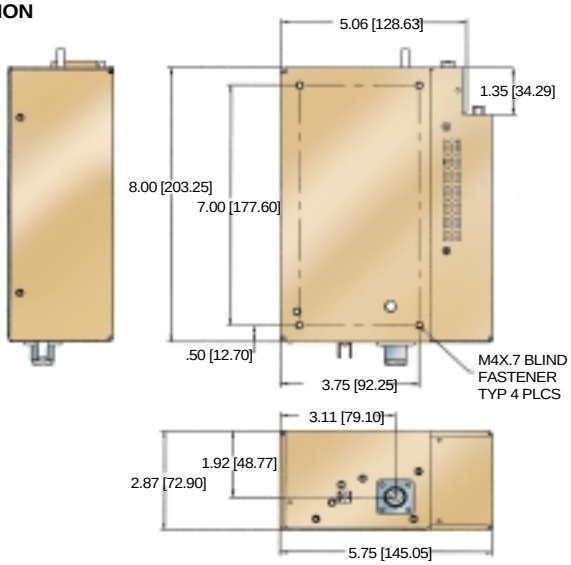
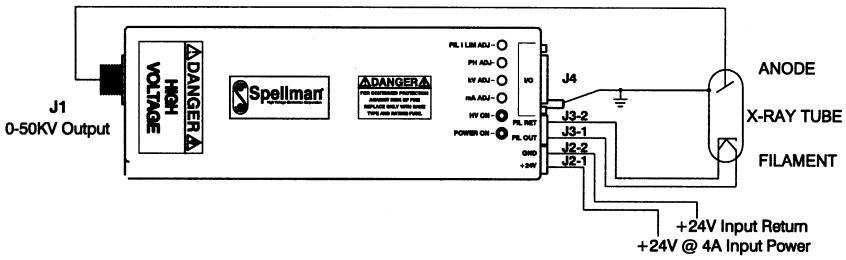
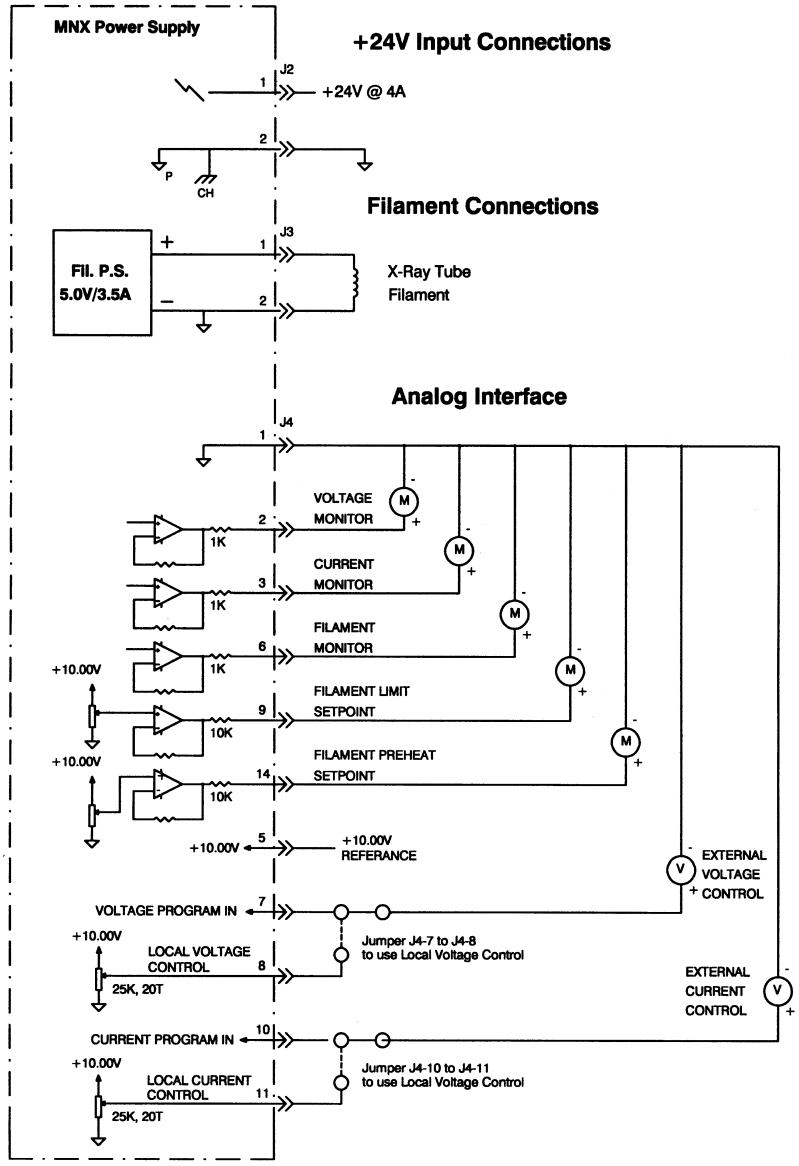


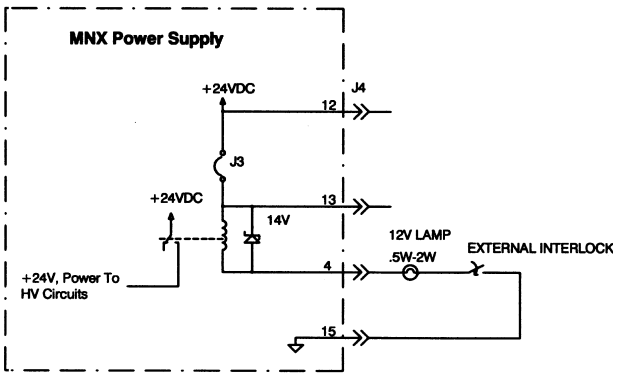


Typical MNX Operating Setup

See Wiring Diagrams For Recommended Analog Interface Connections

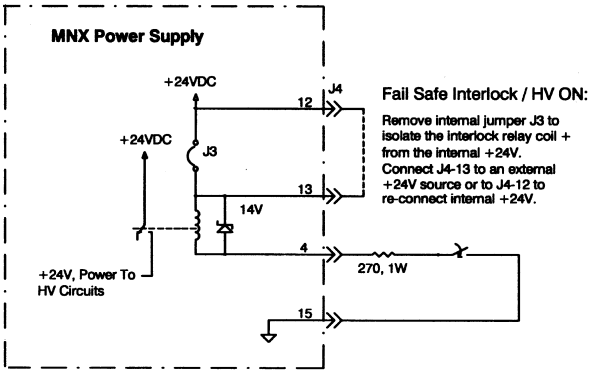


Analog Interface (continued)

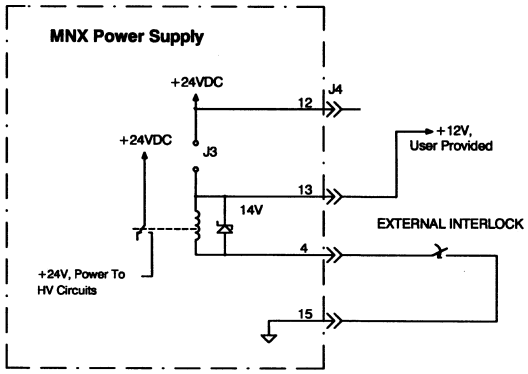


Fail Safe Interlock / HV ON Connections:
See accompanying drawings
for alternate configurations.

Alternate Interlock Configurations



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



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

XRM 50W X-RAY POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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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128014-001 REV.B

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

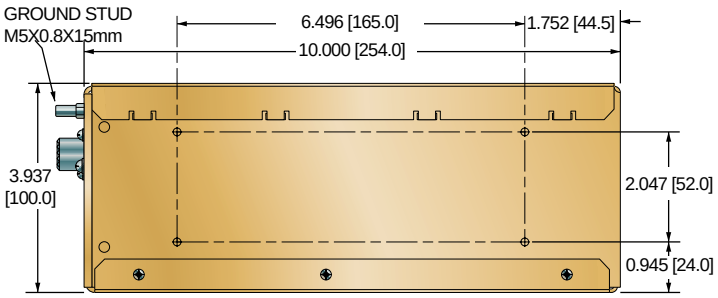
J3	SIGNAL	J3	SIGNAL
1	Filament Out	3	Spare
2	Filament Return		

XRM POWER CONNECTOR 2 PIN

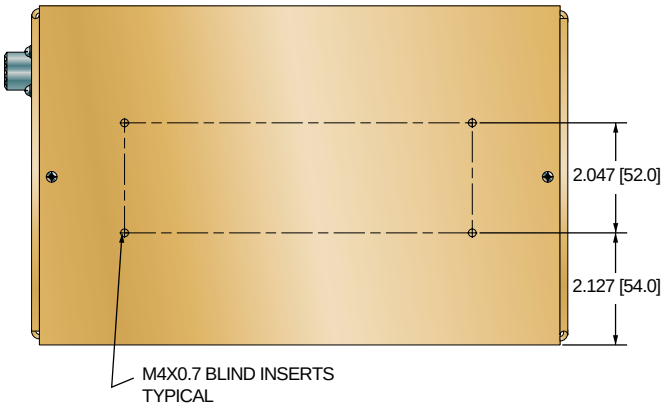
J2	SIGNAL
1	+24V Input
2	24V Return (Gnd.)

DIMENSIONS: in.[mm]

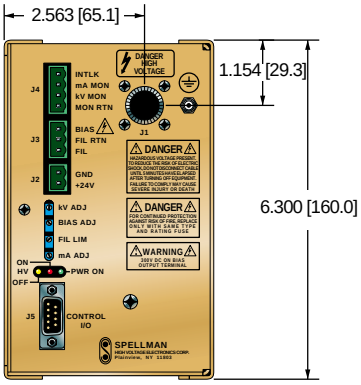
SIDE VIEW



TOP VIEW



BACK VIEW



A1693
ISO 9001
RvA
89/336/EEC
73/23/EEC

CZE 9W AUTO-REVERSING POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

CZE2000

CZE1000R

- *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 ±10%.
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).

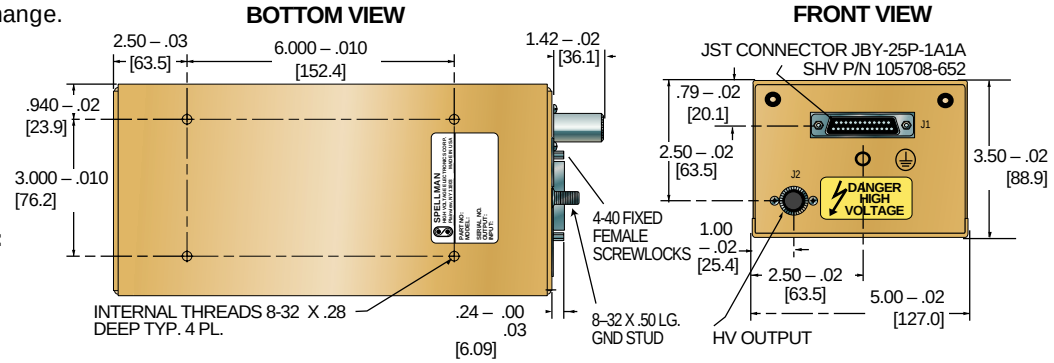
CZE2000 CONNECTOR 25 PIN

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	+10.24Vdc 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 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: DIMENSIONS: in.[mm]



A1693 ISO 9001 RvA 89/336/EEC 73/23/EEC

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128002-001 REV.B

EGM 50kV ELECTRON GUN POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

NEW!
2.5 PPM

- ***LOCAL OR REMOTE CONTROL OF BEAM ENERGY, FILAMENT POWER AND EMISSION CURRENT***
- ***INTEGRATED FLOATING FILAMENT SUPPLY***
- ***ACTIVE BIAS SYSTEM***
- ***RS-232 INTERFACE***
- ***SAFE, GROUND LEVEL REMOTE OR LOCAL CONTROLS***
- ***STABILITY LESS THAN 2.5 PPM.***
- ***OEM CUSTOMIZATION 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 RS-232 interface to reduce end-product development time and ease 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:
1A rms max.

Input Frequency:
47 to 63Hz.

Input Protection:
Input protection is via an integral IEC inlet 3.15A "T" fuse.

Temperature Range:
Operating: 15˚C - 30˚C. (For high stability units, a stable environment is required.)
Storage: 0˚C - 70˚C.

Operating Humidity:
Less than 70% RH.

Input/Output Connections and Cables:
Input power connection is through an IEC 320 connector. 75kV, 3 pin federal standard X-ray connector and mating cable provided.

Local Control:
Local control for Filament Power and Emission Current is provided via pushbutton up/down control switches. Beam Energy ON/OFF is provided via pushbutton switch.

Remote Control:
Remote control is via an RS-232C digital control interface for Beam Energy, Filament Power, and Active Bias.

Monitoring:
Remote monitoring of analog outputs via BNC connectors on the rear panel.

Monitoring From Front Panel Display:
Four digit panel meter displays:
Beam Energy or Bias Voltage(display toggles between Beam Energy and Bias Voltage)
Emission Current
Filament Power

Dimensions:
5¼" (3U)H x19" W x18.9" D(13.3 cm x 48.3 cm x 48 cm).

Weight:
66lbs (30kg).

BEAM ENERGY

Output Voltage:
50kV Fixed ± 2% trim via remote control. Variable outputs and other voltages are available upon request.

Output Current:
300µA maximum.

Polarity:
Negative.

Line Regulation:
Less than 2.5ppm for a 10% line change at 50kV, 300µA output.

Load Regulation:
Less than 10ppm.

Stability:
Less than 2.5ppm/12hours with constant operating conditions. Other stabilities of 5, 10, 20, 50ppm are available on request.

Warm Up Time:
Three hours maximum to achieve full stability.

Ripple and Noise:
Less than 2.5ppm.

Overcurrent Protection:
Protection against overcurrent conditions are provided at 120% of the rated current.

Arc Protection:
Protection against an arc condition is provided. The unit will shut down in an overcurrent condition.

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128017-001 REV.A

FILAMENT POWER SUPPLY

Output Power:
12.7W maximum (adjustable in increments of 0.1W) for an impedance range of 1ohm - 4ohm.

Regulation:
Constant power regulation, regulated on the primary side on all models. (Constant current regulation available on request.)

Line Regulation:
Less than 20ppm for 10% line changes.

Load Regulation:
Less than 5% for 1ohm - 4ohm load changes at 5W to 7W.

Drift:
Less than 100ppm per hour.

Warm Up Time:
3 hour maximum to achieve full stability.

Ripple and Noise:
Less than 1000ppm (operating frequency) and less than 50ppm (10Hz to 3kHz).

Monitor Output:
100mV monitor output for 1W output power via rear panel BNC connector.

ACTIVE BIAS

Voltage:
100V-2kV referenced to the filament power supply. Active bias is automatically controlled to achieve emission current control at a range of 0-300µA.

Emission Current Stability:
50µA

Monitoring:
Emission Current: 1V monitor output corresponds to 100µA emission current.

EGM 50 MONITOR & CONTROL BNC CONNECTORS

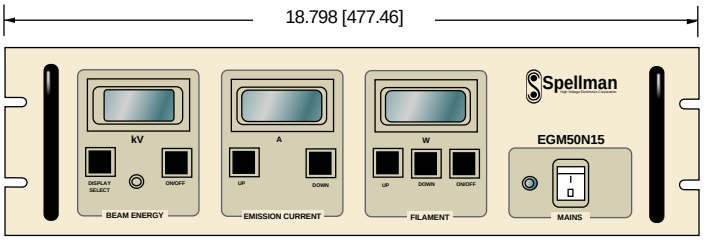
BNC	SIGNAL
1	Beam Energy Monitor Output
2	Emission Current Monitor Output
3	HV Ripple Monitor Output
4	Wehnelt Ripple Monitor Output
5	Filament Power Monitor Output

EGM 50 D CONNECTOR 9 PIN

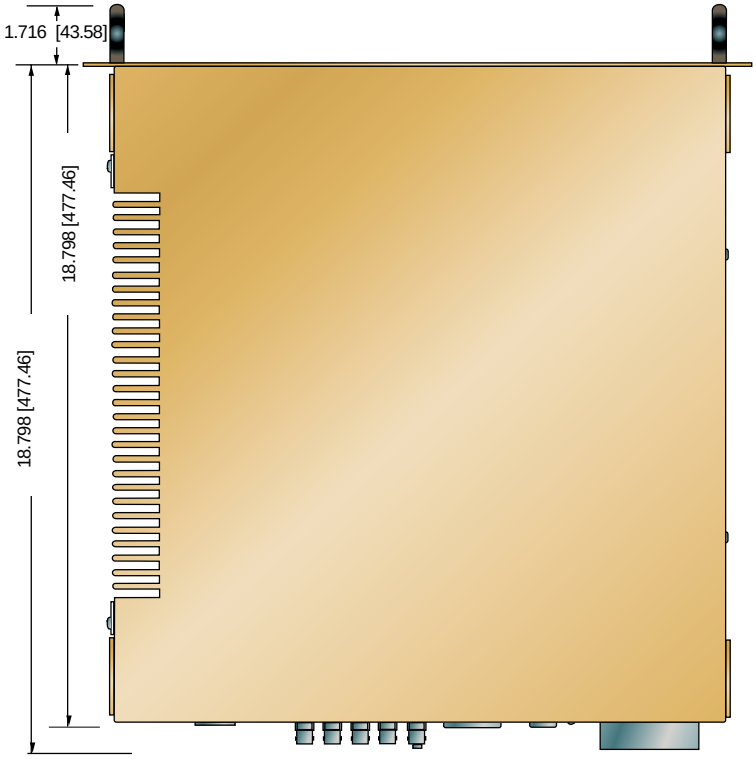
PIN NO.	SIGNAL
1	unused
2	Rx data (system)
3	Tx data (system)
4	Test Mode (link to 0V)
5	0V
6	Interlock/HV Enable (link to 0V)
7	RTS
8	CTS
9	unused

DIMENSIONS: in.[mm]

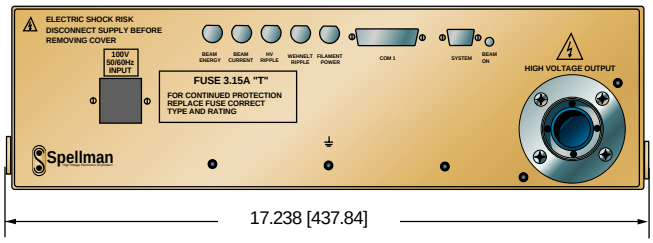
FRONT VIEW



TOP VIEW



BACK VIEW



A1693 ISO 9001
89/336/EEC 73/23/EEC

EBM CUSTOM OEM MODULE FOR SEM APPLICATIONS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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)

A1693 ISO 9001 RvA

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128031-001 REV.A

FIBX

CUSTOM MULTIPLE OUTPUT POWER SUPPLY FOR FOCUSED ION BEAM

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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 Rregulation:	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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128029-001 REV.A

SUPRESSOR 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)

DGM

CUSTOM OEM POWER SUPPLIES FOR IMAGE INTENSIFIERS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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.

A1693
ISO 9001

RvA

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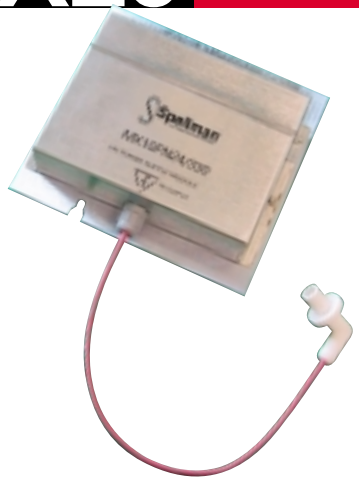
128030-001 REV.A

MX10 HIGH PERFORMANCE DC-DC CONVERTER

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION



- ***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***
- ***COMPACT SHIELDED METAL ENCLOSURE***
- ***FLYING HIGH VOLTAGE OUTPUT CABLE***

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

SPECIFICATIONS

Input Voltage:
+24Vdc, ±0.5 volts

Output Voltage:
±200Vdc to ±10kV

Output Current:
0 to 100uA

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:
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:
≤0.02% Volts p-p

Stability:
0.05% per hour

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:
1.57˝ H X 6.61˝ W X 4.65˝ D (168mm X 115mm X40mm)

Weight:
Approximately 3 pounds (1.4kg)

Interface/PowerConnector:
9 pin male D connector

HV Output Connector:
39.4˝ (1m) of RG59, standard termination.
Alden A200B, optional

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128028-001 REV.A

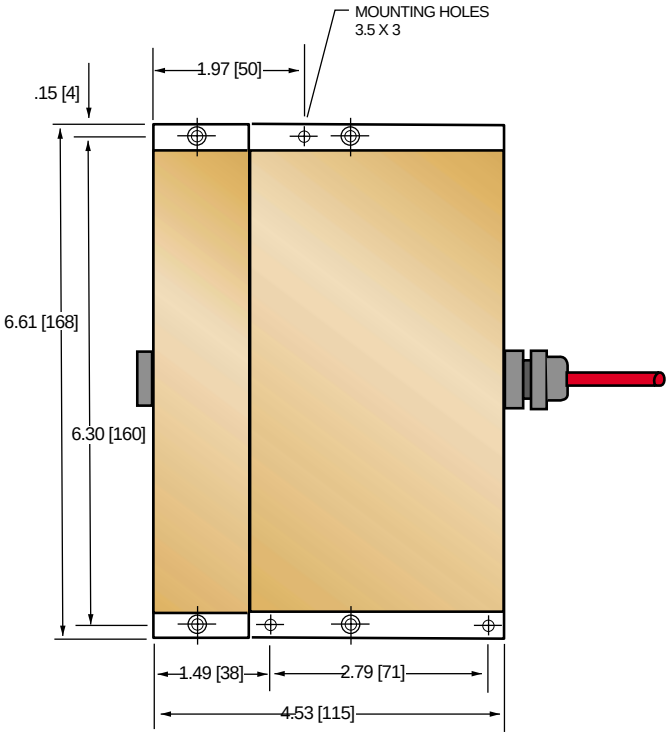
MX10 TERMINAL BLOCK 9 PIN

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
4	Signal Ground	Signal Ground
5	Current Monitor	0-10Vdc = 0-100% of Rated Output
6	Polarity Control Intput	Open or >10V = “NEGATIVE”; <4V = “POSITIVE”
7	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
8	+24V Input	+24V Input
9	Power Ground	Power Ground

DIMENSIONS: in.[mm]

SIDE VIEW

TOP VIEW



A1693
ISO 9001
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89/336/EEC
73/23/EEC

MG 10kW to 120kW MAGNETRON HV POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

MG36-36kW Supply

- *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*

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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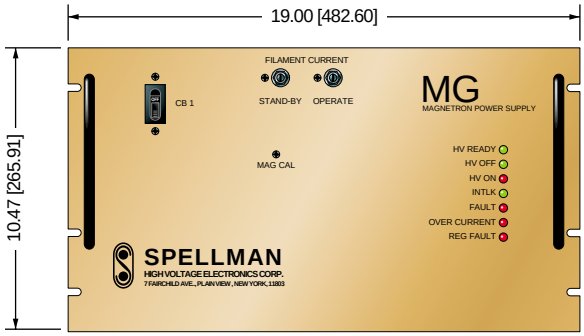
128004-001 REV.B

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"
Weight	lb(kg)	55 (25)	275(125)	310(141.2)	600(275)

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

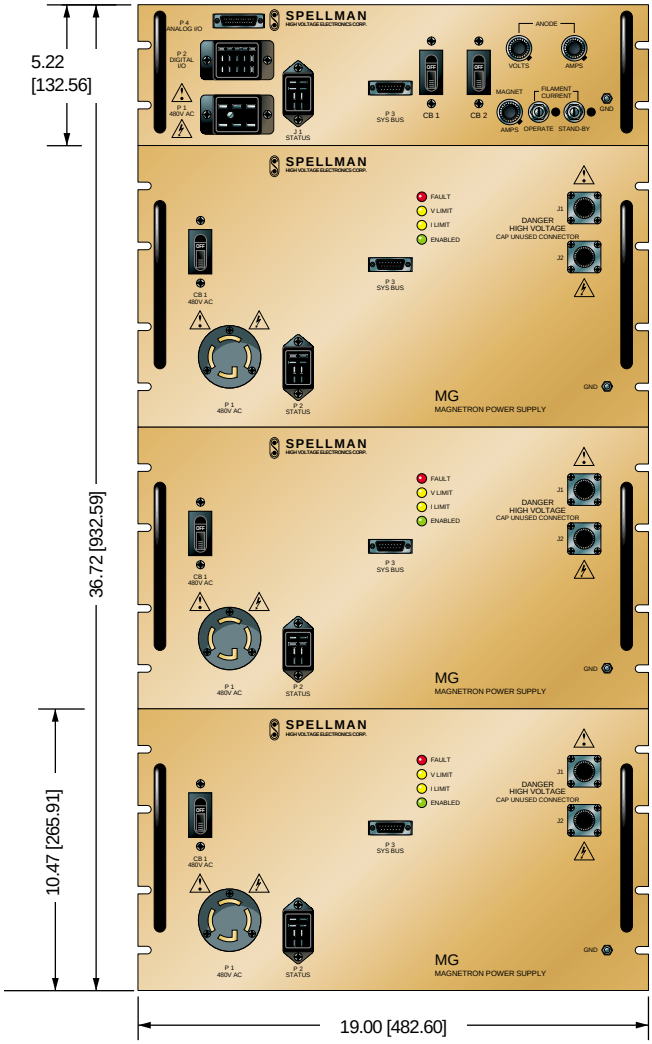
P1	SIGNAL	P1	SIGNAL
7	480Vac (Phase A)	10	Filament Out-A
8	480Vac (Phase B)	11	Mag. Output +
9	Filament Out-B	12	Mag. Output Rtn.

A1693
ISO 9001

RvA

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

FRONT VIEW



Model MG36-36kW Supply

MCP HIGH PERFORMANCE DC-DC CONVERTER

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

NEW! FOR MICROCHANNEL PLATE DETECTORS & ELECTRON MULTIPLIERS

- ***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/PowerConnector:
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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128027-001 REV.A

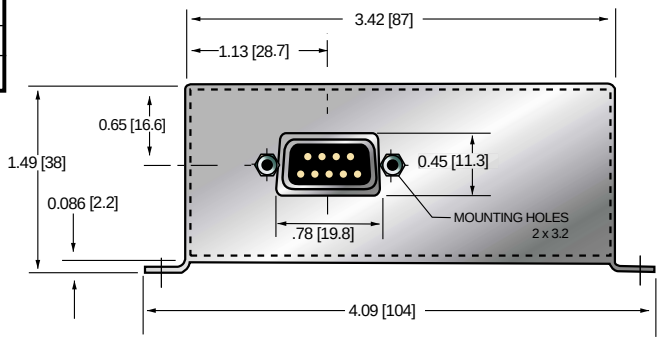
DIMENSIONS: in.[mm]

MCP INTERFACE/POWER CONNECTOR CONNECTIONS

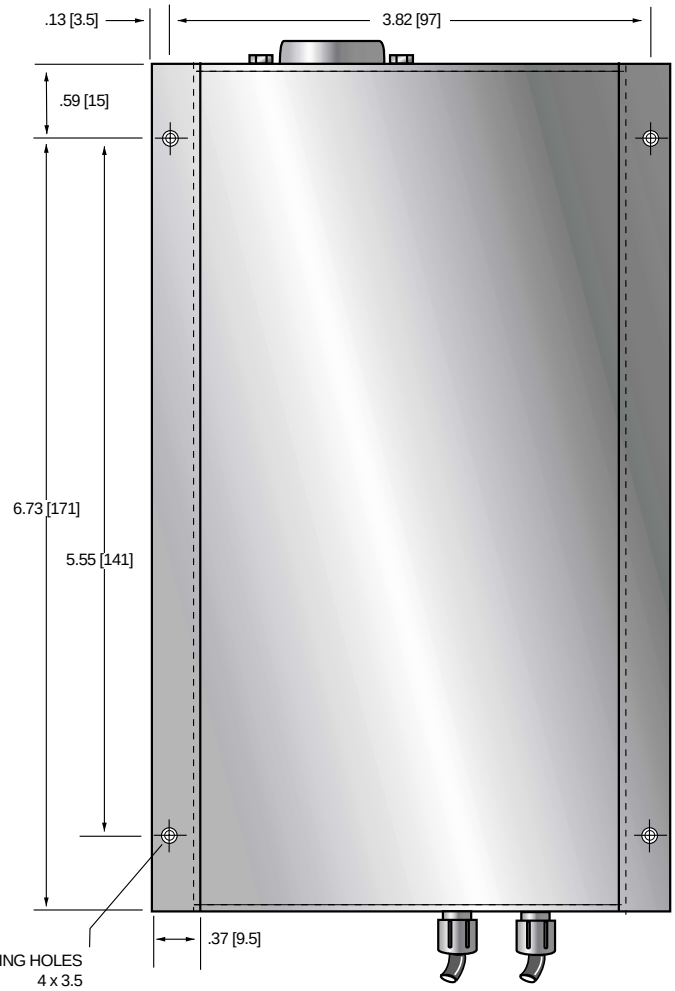
JB1	SIGNAL	SIGNAL PARAMETERS
1	Signal Ground	Signal Ground
2	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
3	+24V Input	+24V Input
4	+24V Input	+24V Input
5	Voltage Monitor	0-5Vdc=0-100% of Rated Output
6	Power Ground	Power Ground
7	Power Ground	Power Ground
8	Power Ground	Power Ground
9	Power Ground	Power Ground

FRONT VIEW

BACK VIEW



TOP VIEW



A1693 ISO 9001

89/336/EEC 73/23/EEC

TOF3000 MASS SPECTROMETRY POWER SUPPLY

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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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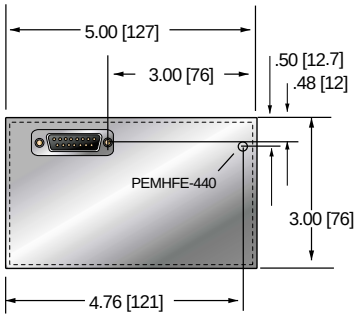
128032-001 REV.A

JB1 INTERFACE CONNECTOR

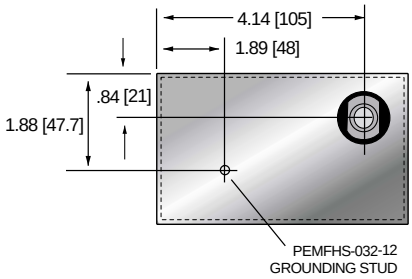
PIN	SIGNAL	SIGNAL PARAMETERS
1	Spare	n/c
2	Voltage Program	0 to 10V=0 to 100% Rated Output
3	Spare	n/c
4	Spare	n/c
5	Voltage Monitor	0 to 10V=0 to 100% Rated Output
6	TTL Polarity Control Signal	Hi=Positive Polarity, Low=Negative Polarity
7	Signal Ground	Signal Ground
8	Power Ground	Power Ground
9	Spare	n/c
10	Spare	n/c
11	Spare	n/c
12	TTL HV Enable	Hi=Inhibit, Low=Enable
13	Current Monitor	0 to 10V=0 to 100% Rated Output
14	Spare	n/c
15	+24Vdc	+24Vdc

DIMENSIONS: in.[mm]

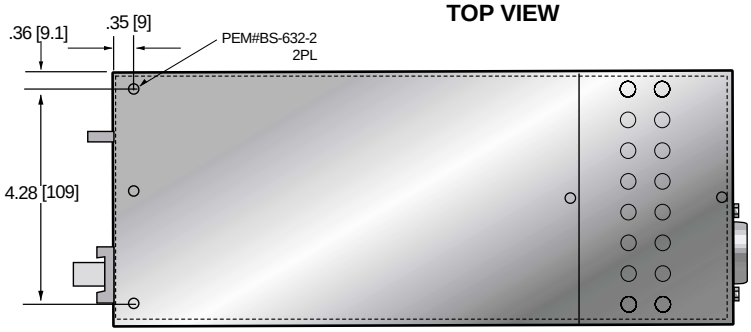
FRONT VIEW



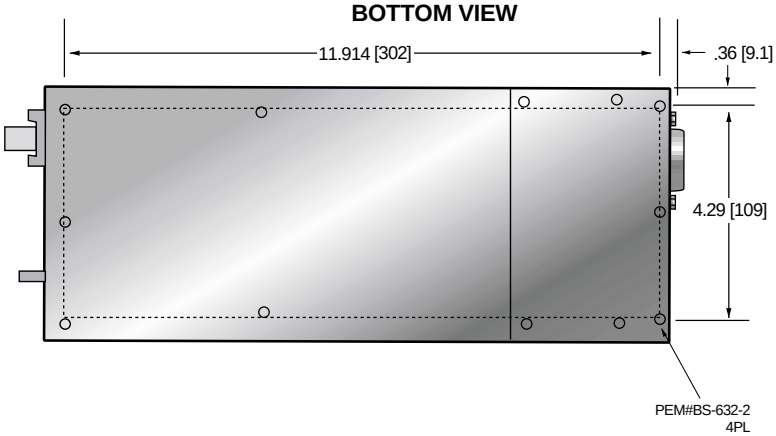
BACK VIEW



TOP VIEW



BOTTOM VIEW



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MPS HIGH VOLTAGE MODULE

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- *10 WATT OUTPUT POWER*
- *VOLTAGE AND CURRENT CONTROL*
- *VOLTAGE AND CURRENT MONITORS*
- *HIGH STABILITY*
- *ULTRA LOW RIPPLE AND NOISE*
- *HIGH VOLTAGE ENABLE CONTROL*
- *CE MARKED*
- *CERTIFIED TO UL61010A-1*

Spellman's new MPS Series of high voltage modules are available in output voltages from 1kV to 10kV at 10 Watts. These high performance units are designed using a hybrid topology of linear and switch mode power conversion techniques, providing low noise and high efficiencies. Excellent ripple and stability performance specifications are provided in this small, cost effective package. A differential amplifier input for the voltage programming signal addresses any external system noise and offset issues. A full feature remote user interface is provided via a 15 pin D connector. Spellman's proprietary HV technology coupled with SMT circuitry results in an ultra compact and lightweight module. The MPS is available in either positive or negative polarity.

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

SPECIFICATIONS

Input Voltage:
+24 Vdc, ±2Vdc

Input Current:
≤1 amp maximum

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

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

Current Regulation:
Line: ≤0.01% of rated output current over specified input voltage range (for VCC Option)

Load: ≤0.01% of rated output current for a ±100µA for full voltage change

Ripple:
≤0.001%Vp-p of full scale rated voltage

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:
1.18˝ H X 2.75˝ W X 5.12˝ D (30mm x 70mm x 130mm)

Weight:
9.88 oz. (280g) for 1-3kV units
14.82 oz. (420g) for 5-10kV units

Interface Connector:
15 pin male D connector

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

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MPS SELECTION TABLE

Maximum Rating		Model Number
kV	mA	
1	10	MPS1*10/24
3	3.3	MPS3*10/24
5	2	MPS5*10/24
10	1	MPS10*10/24

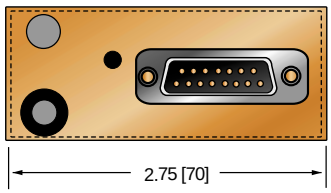
*Specify “P” for positive polarity or “N” for negative polarity.

MPS ANALOG INTERFACE— JB1 15 PIN D CONNECTOR

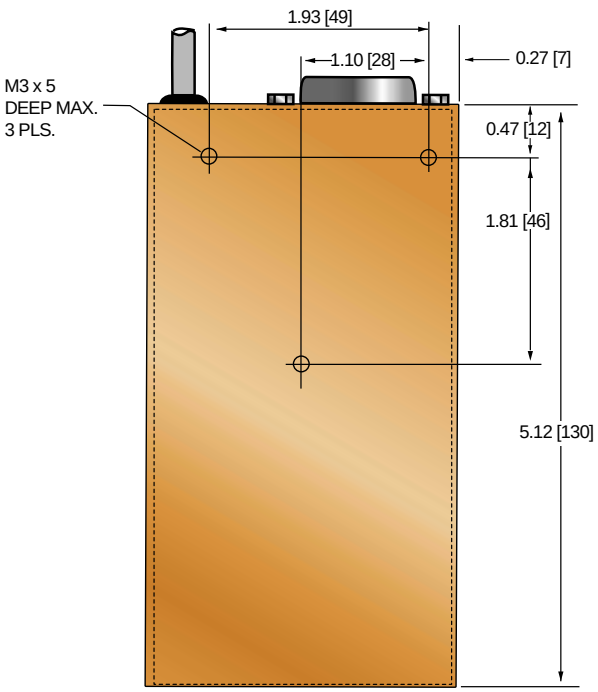
PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1 amp maximum
3	Voltage Monitor Output	0 to 10V=0 to 100% Rated Output, Zout =10kΩ
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
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	Internal Connection	Do Not Use
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	Do Not Use
14	Spare	n/c
15	Spare	n/c

DIMENSIONS: in.[mm]

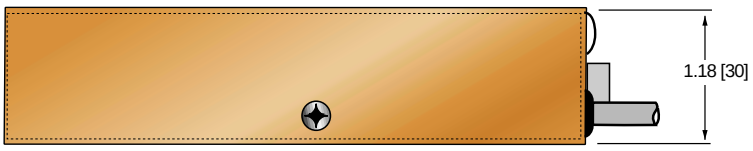
FRONT VIEW



BOTTOM VIEW



SIDE VIEW



XRT 24kW X-RAY TUBE TEST

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

- ***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).

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CUSTOM OEM MODELS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

375V, 750V, 1000V, 1.5kW MULTIPLE OUTPUT POWER SUPPLY FOR WIRELINE DATA LOGGING

This Spellman 1.5kW power supply is specifically designed to meet the rugged outdoor demands of wireline data logging. Reliable operation over wide temperature and humidity extremes, and rough terrain is insured by demanding environmental and vibration testing. A true floating output section capable of producing 1.5kW power at 375V, 750V or 1000V provides unparalleled power selection flexibility. These supplies feature a computer control interface via RS-485.

- ***OUTPUT VOLTAGE: 0-375V, 0-750V AND 0-1000V. FRONT PANEL AND REMOTELY ADJUSTABLE.***
- ***CURRENT: 0-2A, 0-1.5A OR 0-4A***
- ***OUTPUT POWER: 1.5KW CONTINUOUS.***
- ***DIGITAL METERING***
- ***LOW OUTPUT RIPPLE, <150mV***
- ***SIZE: 3.5"H X 19"W X 21"D (8.9CM X 48.3CM X 53.3CM)***
- ***WEIGHT: 25LBS (11.4KG)***
- ***COMPUTER CONTROL INTERFACE VIA RS-485 BUS***

1.5kV TRUE FLOATING OUTPUT ELECTROSTATIC CHUCK POWER SUPPLY

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.

- ***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)***

Bi-polar E-chuck

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±8kV, 0.8W REVERSIBLE POWER SUPPLY FOR MASS SPECTROMETRY

This high voltage power supply features a reversible polarity output up to 8kV with 0.8W of power and very low ripple for Electrospray Mass Spectrometry applications. It provides remote programming for enable, polarity reversal, voltage and current control, and monitoring of current and voltage.

- ***REVERSIBLE POLARITY***
- ***0 TO ±8KV EXTERNALLY PROGRAMMABLE***
- ***VOLTAGE OR CURRENT MODE***
- ***100µA OUTPUT CURRENT***
- ***LOW RIPPLE: 0.1% P-P***
- ***LOW STORED ENERGY***
- ***MODE INDICATOR AND VOLTAGE AND CURRENT MONITORS***
- ***DC INPUT: 24VDC ±10%***
- ***SMALL SIZE: 3.25"H X 4.5"W X 5.5"D (8.3CM X 11.4CM X 14CM)***

7kV, 2.4kW CONTINUOUS POWER SUPPLY FOR NICP SPECTROMETERS

This important analytical instrument application required a low cost, highly reliable and compact high voltage power supply to power a vacuum tube RF power source. It provides a variable dc voltage to a maximum value of 7kV capable at a continuous output of 2.4kW.

- ***7KV, 460MA, 2.4KW POSITIVE SUPPLY***
- ***FAST DYNAMIC RESPONSE, <2MSEC***
- ***FULL REMOTE CONTROL CAPABILITY***
- ***OUTPUT VOLTAGE CONTROL: 0 TO 10V FROM 0 TO MAX VOLTAGE***
- ***OUTPUT RIPPLE: <2% RMS OF OUTPUT VOLTAGE***
- ***OUTPUT VOLTAGE AND CURRENT MONITORING***
- ***EXTERNAL INTERLOCK CIRCUITRY***
- ***COMPACT, LOW COST***

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CUSTOM OEM MODELS

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

165kV, 400mA, 60kW CT SCANNER SUPPLY

Spellman has produced CT Scanner X-ray generators for over 15 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.

- ***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***

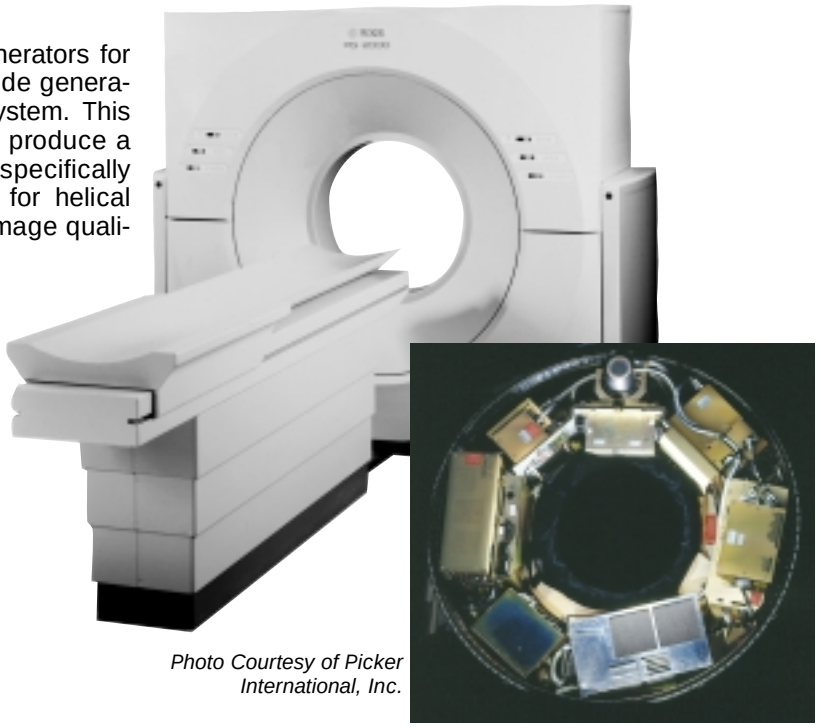

Photo Courtesy of Picker International, Inc.

160kV, 85kW ULTRAFAST CT POWER SUPPLY

Advances in Spellman's state-of-the-art high frequency resonant inverter technology have made it possible to develop this high power 160kV unit in a highly reliable compact package. This Spellman 85kW peak high voltage power supply drives the electron gun in ultra-high speed CT scanners. The single ended power supply provides programmed high voltage from 0 to 160kV at 650mA peak and includes a filament supply floating at 160kV programmable from 0 to 10Vrms. Fault and Arc recovery are featured.

- ***EXTREMELY LOW RIPPLE***
- ***CONTROLS FOR KV, MA, AND FILAMENT CURRENT LIMIT***
- ***OUTPUT VOLTAGE: 0-160KV***
- ***EMISSION CURRENT: 0-650MA***
- ***OUTPUT POWER: 85KW PEAK OUTPUT***
- ***SLEW RATE: 10KV/MSEC***
- ***FILAMENT: 0-10VRMS, PROGRAMMABLE***
- ***SMALL VOLUME: 30"H X 24"W X 27"D (76.2CM X 61CM X 68.6CM)***

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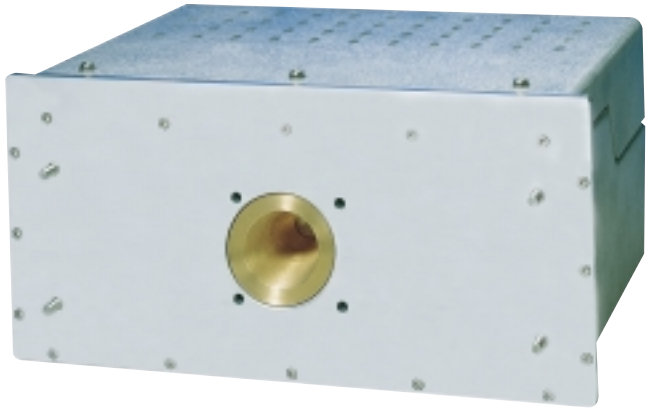
INTEGRATED X-RAY GENERATOR SYSTEMS



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

Spellman's expertise in X-ray power supplies has led to the development of various configurations of integrated X-ray Generator Systems consisting of a high voltage power supply, isolated filament supply, and X-ray tube housed either with the electronics or separately. High voltage insulation is provided either by solid encapsulant or purified oil.

TYPICAL APPLICATIONS

Bone Densitometry
C-arm Radiography
Non-Destructive Testing

SPECIFICATIONS

kV:
Max. kV from 10kV to 110kV (±55kV)

mA:
50µA to 10mA

Power:
10W to 300W continuous with 1.1kW peak capabilities

Input:
Ac or dc

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40kV AT 600W PEAK WITH 2.5mS DYNAMIC RESPONSE FOR PROJECTION TELEVISION APPLICATIONS

This high performance high voltage power supply provides Projection Television cathode ray tubes with a 40kV anode voltage and three separate G2 supplies of 200V to 1000V with excellent regulation and ripple. The module has continuous short circuit protection and is capable of withstanding arcing of the anode supply to ground.

- ***ULTRA-LOW RIPPLE <8V P-P***
- ***ULTRA FAST DYNAMIC RESPONSE <2.5 MILLISECONDS***
- ***>600W PULSE CAPABILITY***
- ***UP TO 40KV OUTPUT TO 15MA***
- ***THREE INDEPENDENTLY CONTROLLABLE GRID OUTPUTS***

BALLASTLESS 200W CO_2 LASER POWER SUPPLY

Spellman's high performance low cost laser supply powers a CO_2 Laser discharge tube. The Laser supply has an average output power of 200W and provides 260W of peak power for discharge ignition with a typical efficiency of 90%. Overload protection for voltage and current are featured. The unit has a remote programming capability for current and voltage.

- ***UP TO 15KV, 20MA, 200W AVERAGE***
- ***PULSE MODE - UP TO 20HZ***
- ***HIGH STABILITY - 0.03% PER HOUR***
- ***LOW RIPPLE ±3% OF OUTPUT VOLTAGE***
- ***LIGHTWEIGHT - 8LBS (3.6KG)***
- ***SMALL FOOTPRINT - 3.2"H X 5"W X 10"D (8.1CM X 12.7CM X 2.54CM)***
- ***OPEN FRAME DESIGN AVAILABLE***
- ***IEC/UL/VDE/TUV APPROVED***
- ***NO BALLAST REQUIRED***

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125kV, 70W MULTIPLE OUTPUT POWER SUPPLY FOR MICROFOCUS X-RAY TUBES

Spellman's MF Series incorporates four independent adjustable power supplies to drive Microfocus X-ray tubes in a compact 5¼" high rack-mount chassis. Remote programming, monitoring and interlock controls with overload trip are featured.

- ***125KV, 1MA, 70W ANODE SUPPLY***
- ***ADJUSTABLE FOCUS, BIAS & HEATER SUPPLIES ARE PROVIDED.***
- ***OPTIONAL DUAL FOCAL SPOT SELECTION IS AVAILABLE***
- ***LOW PEAK DISCHARGE CURRENT TO PROTECT X-RAY TUBE.***
- ***CONSTANT POWER CONTROL OPTION IS AVAILABLE***

±67.5kV, 675W POWER SUPPLY FOR MEDICAL X-RAY SYSTEMS

This compact module is designed to mount in the base of a C-Arm for medical diagnostic X-ray systems. Small size, tight specifications and reliable performance are featured in the ±67.5kV power supply which also incorporates an adjustable filament supply referenced to the cathode. Emission current is adjustable from 0 to 5mA.

- ***0.05% EMISSION CURRENT REGULATION***
- ***ADJUSTABLE FILAMENT SUPPLY 0 TO 15V, 4.0A***
- ***OVERCURRENT AND OVERVOLTAGE CIRCUITRY WITH FAULT STATUS INDICATION***
- ***REMOTE ANALOG VOLTAGE AND CURRENT REFERENCE CONTROL***
- ***VOLTAGE AND CURRENT TEST POINTS***
- ***385VDC INPUT***
- ***IEC/UL/VDE/TUV APPROVED***
- ***COMPACT SIZE: 3.44"H X 12"W X 19"D (8.7CM X 30.5CM X 48.3CM)***

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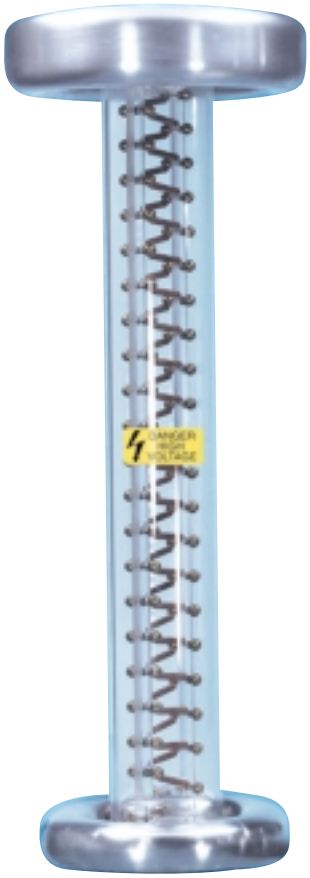

Resistive Voltage Dividers

...for the measurement of high voltages using a standard digital voltmeter*

- **HIGH INPUT IMPEDANCE**
- **25ppm TEMPERATURE COEFFICIENT**
- **100kV AND 200kV MODELS**
- **CORONA-FREE OPERATION**
- **0.5% ACCURACY(HIGHER ACCURACIES AVAILABLE)**

WARNING

DANGEROUS VOLTAGES MAY BE PRESENT ON THIS EQUIPMENT THAT MAY BE FATAL. OBSERVE EXTREME CAUTION WHEN OPERATING AND WORKING NEAR HIGH VOLTAGE DEVICES. NEVER TOUCH ANY HIGH VOLTAGE ASSEMBLIES THAT ARE SUSPECTED TO BE ENERGIZED OR CHARGED. DO NOT HANDLE OR COME WITHIN THE PROXIMITY OF HIGH VOLTAGE CONNECTIONS UNTIL ALL EQUIPMENT IS OFF AND THE SET-UP'S CAPACITANCE IS DISCHARGED. FAILURE TO FOLLOW SAFETY PROCEDURES MAY BE FATAL. PLEASE SEE PRODUCT DATASHEET AND INSTRUCTION MANUAL BEFORE OPERATING.

Spellman's Resistive Voltage Dividers provide laboratory or production facilities with a convenient method of measuring up to 100kVdc or 200kVdc with accuracy better than 0.5%. The Dividers are designed for use with high impedance digital voltmeters or differential voltmeters. The HVD Series dividers are housed in plexiglass cylinders containing a matched set of precision metal film resistors. These resistors have a temperature coefficient of less than 25 ppm. A ladder-type construction is used in conjunction with polished HV bushing specifically designed to eliminate corona. BNC connectors provide interfacing with standard DVMs.

*Impedance of 10Gohm or higher.

HVD

	HVD100	HVD200
Input Voltage	0-100kVdc	0-200kVdc
Input Impedance	1000Mohms	2000Mohms
Output Impedance	1M; 100kohms	20kohms
Output Taps	100V, 10V	2V
Accuracy	0.5%: (0.1% opt)[1]	0.5%: (0.25% opt)[2]
Stability	0.01%/8hrs	0.025%/8hrs
Temp. Coefficient	25 ppm/°C	25 ppm/°C
Height	17.5" (44.5cm)	33.5" (84.5cm)
Max. Diameter	10" (25.4cm)	12" (30.5cm)
Weight	6.75 lbs (3.1kg)	12 lbs (5.5kg)
Output Connector	BNC type	BNC type

(1) For accuracy of 0.1% specify HVD100-1
(2) For accuracy of 0.25% specify HVD200-1

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