



AMERICAN HIGH VOLTAGE
POWER SUPPLIES FOR THE WORLD

SW Series Precision High Voltage Power Supply

SW Series

General Description

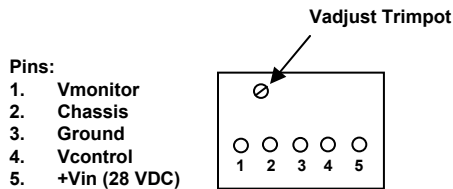
The SW Series high voltage power supplies are extremely well regulated sources of high voltage which offer low ripple and EMI. They are ideal for electro-optical applications such as precision CRT displays, e-beam lithography, and electron microscopes. They provide outputs of up to 30kV and are rated up to 20 Watts of power. Both positive and negative polarities are available. The output voltage of the SW may be varied either by the internal trimpot or by an external voltage or resistance. The return output lead is internally connected to the input power return. Each power supply may be programmed down to 10 % output and offers 0.001% line and load regulation. All SW's are transient protected, reverse input voltage and short circuit protected.

Features

- Regulated Output to 0.001%
- Low output ripple: 0.001%
- Up to 5,000 VDC available
- 10W and 20W power
- 24 VDC input
- Resistance or Voltage Programming



Connection Diagram



HV output connector
AMP LGH type

Connector:

- 10kV: LGH-1
- 15 kV: LGH-1
- 20 KV: LGH-2
- 25 kV: LGH-3
- 30 kV: LGH-3

Available Models: (other input voltages available):

10 Watts Models:

Name	Maximum Output Voltage	Maximum Output Current	1 st Year
SW-5P	5,000 (positive)	2 mA	1994
SW-10P	10,000 (positive)	1 mA	1993
SW-15P	15,000 (positive)	0.67 mA	2005
SW-20P	20,000 (positive)	0.5 mA	1988
SW-25P	25,000 (positive)	0.4 mA	1992
SW-30P	30,000 (positive)	0.33 mA	1989
SW-5N	5,000 (negative)	2 mA	1990
SW-10N	10,000 (negative)	1 mA	1995
SW-15N	15,000 (negative)	0.67 mA	1991
SW-20N	20,000 (negative)	0.5 mA	1998
SW-25N	25,000 (negative)	0.4 mA	1991
SW-30N	30,000 (negative)	0.33 mA	1999

Available Models: (other input voltages available):

20 Watts Models:

Name	Maximum Output Voltage	Maximum Output Current	1st Year
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SW-5P	5,000 (positive)	4 mA	1994
SW-10P	10,000 (positive)	2 mA	1993
SW-15P	15,000 (positive)	1.33 mA	2005
SW-20P	20,000 (positive)	1 mA	1988
SW-25P	25,000 (positive)	0.8 mA	1992
SW-30P	30,000 (positive)	0.67 mA	1989
SW-5N	5,000 (negative)	4 mA	1990
SW-10N	10,000 (negative)	2 mA	1995
SW-15N	15,000 (negative)	1.33 mA	1991
SW-20N	20,000 (negative)	1 mA	1998
SW-25N	25,000 (negative)	0.8 mA	1991
SW-30N	30,000 (negative)	0.67 mA	1999



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Electrical Characteristics

(at 25 degrees C unless otherwise specified)

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Parameter	Conditions	Value			Units
		Min	Typical	Max	
Supply Voltage*:	(all power models)	25	28	31	VDC
Input Current:	No Load:	225	250	275	mA
	Full Load (20 W):	1,050	1,100	1,150	mA
Output Ripple:	No Load (all models):	0.04%	0.05%	0.05%	Vpp
	Full Load (all models):	0.045%	0.05%	0.06%	Vpp
Load Regulation:	No Load to Full Load			0.001%	V _{NL} /V _L
	Half Load to Full Load			0.001%	V _{NL} /V _L
Output Linearity	No Load		0.01%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT (ideal)}}$
Output Linearity	Full Load (all models):		0.01%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT (ideal)}}$
Short Circuit Current:	Try-again circuit		200	300	mA
Power Efficiency:	Full Load	55%	65%	70%	$\frac{P_{OUT}}{P_{IN}}$
Reverse Input Polarity	Protected to 50 VDC				
Temperature Drift:	No Load			50	ppm/DegC
	Full Load			50	ppm/Deg C
Thermal Rise:	No Load (case)			15	degrees C
	Full Load (case)			30	degrees C
Slew Rate (10% - 90%)	No Load			100	mS
	Full Load			120	mS
Slew Rate (90% - 10%)	No Load			200	mS
	Full Load			100	mS
Drain Out Time	No Load (5 TC)			150	mS

* Other input voltages available: 15VDC, 24VDC, 28VDC and 48VDC



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Physical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Dimensions	MKS	127L x 78.7W x 50.8H	mm
	English	5.0L x 3.1W x 2.0H	inches
Volume:	MKS	507.7	cm ³
	English	31.0	inch ³
Mass:	MKS	875	grams
	English	31	oz
Packaging:	Elastomer		
Finish	Black anodized aluminum		
Terminations: Input: Output:	Electro Plated Brass terminals AMP LGH style connector		

Environmental Characteristics

(at 25 degrees C unless otherwise specified)

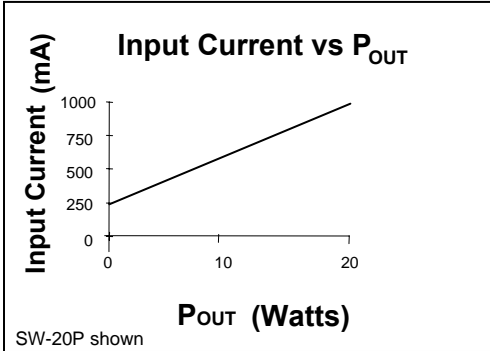
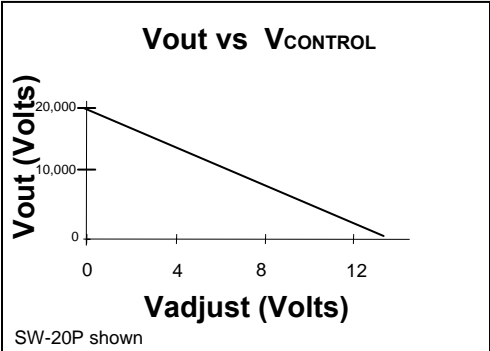
Parameter	Conditions	Value	Units
Temperature Range	case temperature	-40 degrees to + 85 degrees	Celsius
	case temperature	-40 degrees to + 185 degrees	Fahrenheit
Shock:	MIL-STD-810 Method 516	40 g's	Proc IV
Altitude:	pins sealed against corona	-350 to + 16,700	meters
	pins sealed against corona	-1,000 to +55,000	feet
Vibrations:	MIL-STD-810 Method 514	20 g's	Curve E
Thermal Shock	MIL-STD-810 Method 504	-40 deg C to + 71 deg C	Class 2



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SW Series Performance Charts



SW Series Application Notes

The SW Series high voltage power supplies are powered by an input voltage of 28 VDC. They can be set via the internal trimpot or controlled by an external resistance or an external voltage. Figure 1 below shows the basic hookup which provides the maximum regulated output voltage that the power supply is designed for. This value may be adjusted down by utilization of the trimpot located at the front side of the power supply. The voltage adjust pin is grounded in this condition. The maximum output voltage and polarity is fixed by the model and is a regulated output. This means, the output voltage will not vary with input line fluctuations or output load changes up to the maximum power rating for the power supply. As shown in Figure 1 below, the simple connection of an SW unit to a DC source of voltage will provide a high voltage stepped-up output. The input AC bypass capacitor C1 is optional and is utilized to prevent switching spikes from riding back on the input power lines. Values of 0.1 uF to 10 uF are commonly used.

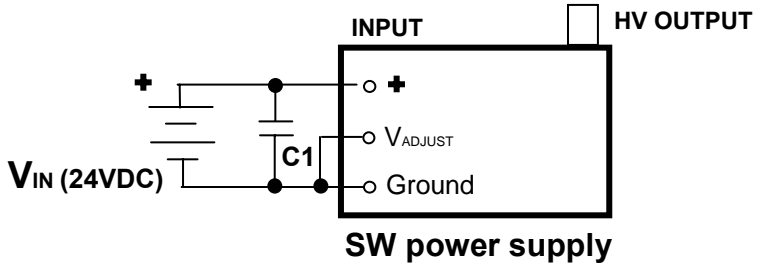


Figure 1: Basic SW hookup schematic for maximum output

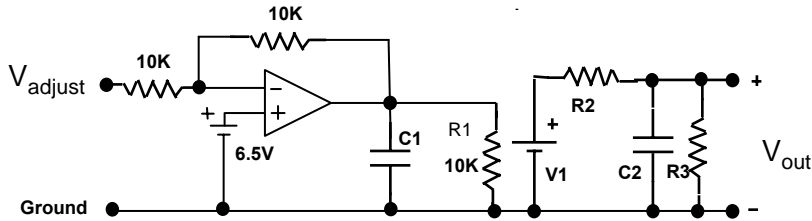
The output voltage of the SW unit may be reduced in value by placing a voltage higher than zero volts (up to +13.0 volts) onto the voltage adjust pin. By increasing this voltage the output voltage of the power supply will be reduced to zero. Impedance of the voltage adjust pin is approximately 50 KOhms. The adjust voltage is referenced to the input ground. There exists an internal connection between the input ground and output ground in all SW power supplies. The SW also provides an output monitor which is a 1000:1 scaled down value of the output voltage (+/-10%). The output impedance of this monitor is less than 100 K Ohms.



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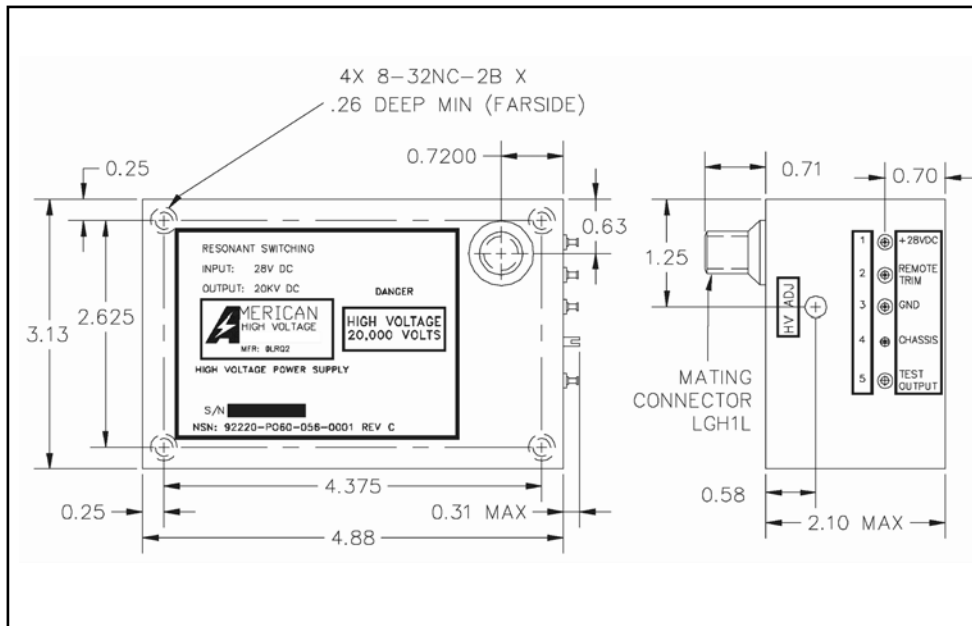
Equivalent SW Circuit Model



Equivalent SW High Voltage Power Supply Circuit Model

- R1 = (10K) Ohms
- R2 = (0.002 x Vout_{max}) Ohms
- R3 = (1 x Vout_{max}²) Ohms
- C1 = (0.01 x 10⁻⁶) Farads = 50 K Ohms
- C2 = (0.02 x Iout_{max} / Vout_{max}) Farads
- V1 = (Vr1 x Vout_{max} / 13.0) Volts

Outline Drawing: (inches)



Ordering Information:

SW - XXY

Example:

- SW - 20P: Maximum output = 20,000 V positive polarity
- SW - 15N: Maximum output = 15,000 V negative polarity

- XX = Output voltage: 10 = 10 kV
- Y = Polarity: 15 = 15 kV
- 20 = 20 kV
- 30 = 30 kV