AMERICAN HIGH VOLTAGE

SW Series
Precision High Voltage Power Supply

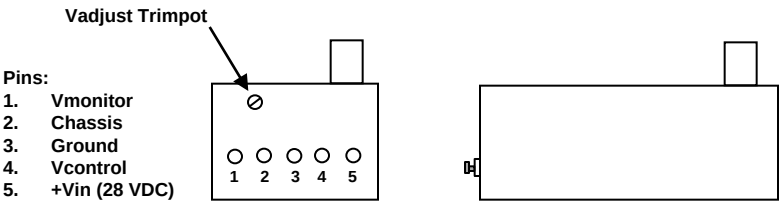
General Description

The SW Series 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, electron microscopes, e-beam lithography, and X-Ray equipment. They provide outputs of up 30kV and are rated at 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 by an external voltage or external 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: 0.05%**
- **Up to 30,000 VDC available**
- **20 Watt power**
- **28 VDC input**
- **Resistance or Voltage Programming**

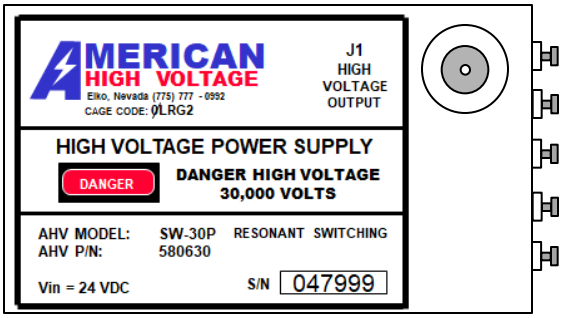
Connection Diagram



HV output connector
AMP LGH type:

Connector:

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



AMERICAN HIGH VOLTAGE

Electrical Characteristics

(at 25 degrees C unless otherwise specified)

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): Full Load (all models):		0.04% 0.045%	0.05% 0.05%	0.05% 0.06%	Vpp Vpp
Load Regulation:	No Load to Full Load Half Load to Full Load				0.001% 0.001%	V_{NL}/V_L VNL/VL
Output Linearity	No Load			0.01%		ΔV_{OUT} / $\Delta V_{OUT\ (ideal)}$
Output Linearity	Full Load (all models):			0.01%		ΔV_{OUT} / $\Delta V_{OUT\ (Ideal)}$
Short Circuit Current:	Try-again circuit			200	300	mA
Power Efficiency:	Full Load		55%	65%	70%	P_{OUT} / P_{IN}
Reverse Input Polarity	Protected to 50 VDC					
Temperature Drift:	No Load Full Load				50 50	ppm/DegC ppm/Deg C
Thermal Rise:	No Load (case) Full Load (case)				15 30	degrees C degrees C
Slew Rate (10% - 90%)	No Load Full Load				100 120	mS mS
Slew Rate (90% - 10%)	No Load Full Load				200 100	mS mS
Drain Out Time	No Load (5 TC)				150	mS

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

AMERICAN HIGH VOLTAGE

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:	Electro Plated Brass terminals		
Output:	AMP LGH style connector		

Environmental Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Temperature Range	case temperature	-55 degrees to + 85 degrees	Celsius
	case temperature	-67 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	-55 deg C to + 71 deg C	Class 2

AMERICAN HIGH VOLTAGE

Models Available (as of August 2019):

(Vin = 28 VDC)

Model	Output Voltage Range	Power	Ripple (max)
SW-10	0 – 10,000 VDC	20 Watts	5 Vpp
SW-20	0 – 20,000 VDC	20 Watts	10 Vpp
SW-25	0 – 25,000 VDC	20 Watts	12.5 Vpp
SW-30	0 – 30,000 VDC	20 Watts	15 Vpp
SW-20N	0 – 20,000 VDC (Negative)	20 Watts	10 Vpp
SW-30N	0 – 30,000 VDC (Negative)	20 Watts	15 Vpp
SW-7.5	0 – 7,500 VDC	20 Watts	3.75 Vpp

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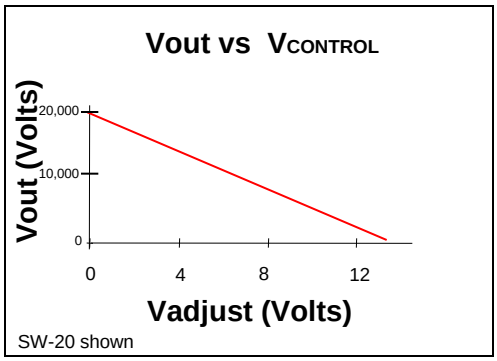
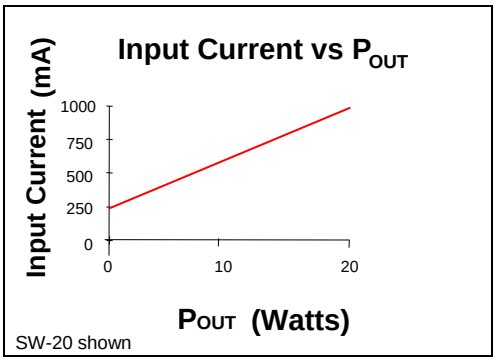
SW Series Performance Charts





SW Series Application Notes

The SW Series high voltage modules 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.

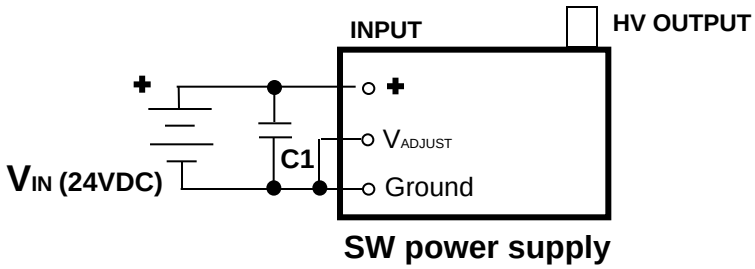
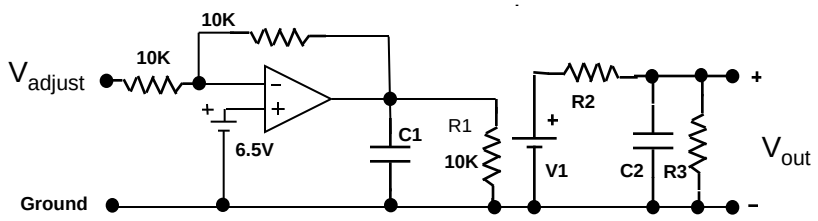


Figure 1: Basic SW hookup schematic for maximum output

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.

AMERICAN HIGH VOLTAGE

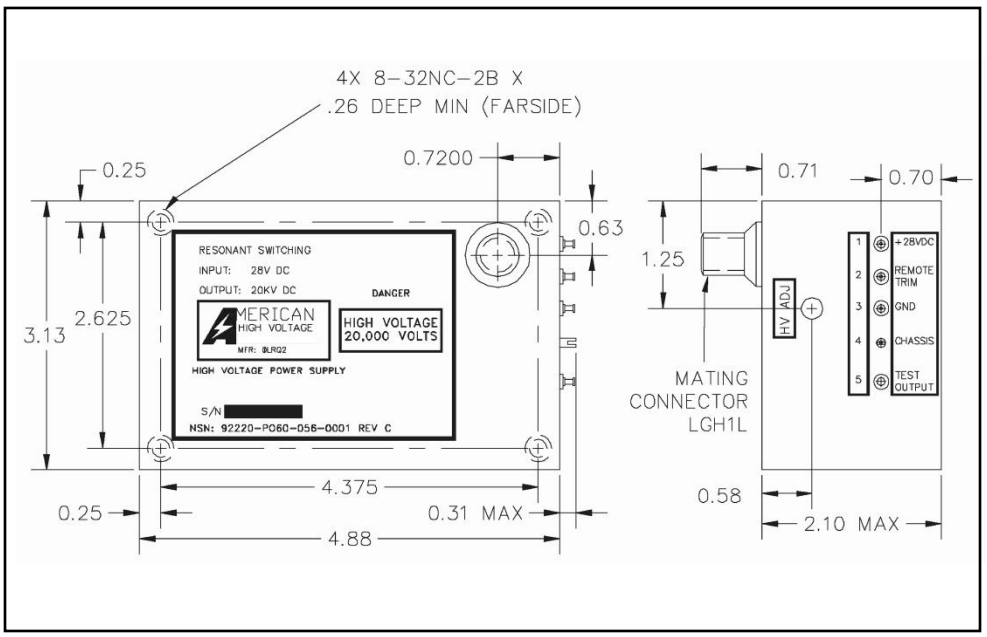
Equivalent SW Circuit Model



Equivalent SW High Voltage Power Supply Circuit Model

R1 = (10K) *Ohms*
R2 = (0.002 x $Vout_{max}$) *Ohm s*
R3 = (1 x $Vout_{max}^{2}$) *Ohms*
C1 = (0.01 x 10^{-6}) *Farads*2 = 50 K Ohms
C2 = (0.02 x $Iout_{max}$ / $Vout_{max}$) *Farads*
V1 = (V_{R1} x $Vout_{max}$ / 13.0) *Volts*

Outline Drawing: (inches)



Ordering Information:

SW – XXY

Example:

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

XX = Output voltage: 10 = 10 kV
Y = N for negative 15 = 15 kV
20 = 20 kV
30 = 30 kV