AMERICAN HIGH VOLTAGE

SCR Series
High Voltage Power Supply

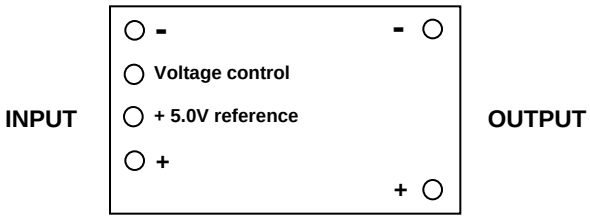
General Description

The SCR Series are regulated high voltage power supplies. They provide outputs of up 5kV and are rated at 5 Watts of power. The output voltage of the SCR may be varied either with an external resistance or external control voltage. The output ripple is typically less than 1% at full power. The return output lead is internally connected to the input power return. Both positive and negative output SCR power supplies are available. Each power supply may be programmed down to zero volts output and offer 0.1% line and load regulation. All SCR's are reverse input voltage and short circuit protected.

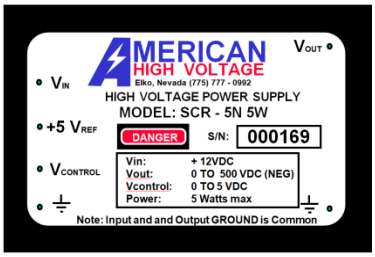
Features

- Regulated Output
- Encapsulated
- 50 VDC to 5,000 VDC available
- 5 Watt power
- 12 VDC input
- Resistance or Voltage Programming

Connection Diagram



Bottom View



Top View

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Electrical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions		Value			Units
			Min	Typical	Max	
Supply Voltage*:	(all power models)		10.8	12	13.2	VDC
Input Current:	No Load:		40	50	75	mA
	Full Load:		550	600	700	mA
Output Ripple:	No Load (all models): Full Load (all models):		0.7% 0.8%	0.7% 0.8%	1% 1%	Vpp Vpp
Load Regulation:	No Load to Full Load Half Load to Full Load				0.1% 0.1%	V_{NL}/V_L VNL/VL
Output Linearity	No Load			1%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT\ (ideal)}}$
Output Linearity	Full Load (all models):			1%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT\ (Ideal)}}$
Short Circuit Current:				200	300	mA
Power Efficiency:	Full Load		60%	70%	75%	$\frac{P_{OUT}}{P_{IN}}$
Reverse Input Polarity	Protected to 20 VDC					
Temperature Drift:	No Load Full Load				200 200	ppm/DegC ppm/Deg C
Thermal Rise:	No Load (case) Full Load (case)				15 25	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**

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Physical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Dimensions	MKS	38.1 W x 63.5 L x 19 H	mm
	English	1.5 W x 2.5 L x 0.75 H	inches
Volume:	MKS	46	cm^3
	English	2.8	$inch^3$
Mass:	MKS	120	grams
	English	4.3	oz
Packaging:	Solid Epoxy Thermosetting		
Finish	Smooth Dial-Phthalate Case		
Terminations:	Gold Plated Brass pins (6)		

Environmental Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Temperature Range	case temperature	-40 degrees to + 71 degrees	Celsius
	case temperature	-40 degrees to + 160 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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Models Available (as of August 2019):

(Vin = 0 – 12 VDC)

Model	Output Voltage Range	Power	Ripple (max)
SCR – 0.5P	0 – 50 VDC	5 Watt	0.5 Vpp
SCR - 0.5N	0 – 50 VDC (Negative)	5 Watt	0.5 Vpp
SCR – 1P	0 – 100 VDC	5 Watt	1 Vpp
SCR - 1N	0 – 100 VDC (Negative)	5 Watt	1 Vpp
SCR – 2P	0 – 200 VDC	5 Watt	2 Vpp
SCR - 2N	0 – 200 VDC (Negative)	5 Watt	2 Vpp
SCR – 3P	0 – 300 VDC	5 Watt	3 Vpp
SCR - 3N	0 – 300 VDC (Negative)	5 Watt	3 Vpp
SCR – 5P	0 – 500 VDC	5 Watt	5 Vpp
SCR - 5N	0 – 500 VDC (Negative)	5 Watt	5 Vpp
SCR – 10P	0 – 1,000 VDC	5 Watt	10 Vpp
SCR - 10N	0 – 1,000 VDC (Negative)	5 Watt	10 Vpp
SCR – 20P	0 – 2,000 VDC	5 Watt	20 Vpp
SCR - 20N	0 – 2,000 VDC (Negative)	5 Watt	20 Vpp
SCR – 30P	0 – 3,000 VDC	5 Watt	30 Vpp
SCR - 30N	0 – 3,000 VDC (Negative)	5 Watt	30 Vpp
SCR – 40P	0 – 4,000 VDC	5 Watt	40 Vpp
SCR - 40N	0 – 4,000 VDC (Negative)	5 Watt	40 Vpp
SCR – 50P	0 – 5,000 VDC	5 Watt	50 Vpp
SCR - 50N	0 – 5,000 VDC (Negative)	5 Watt	50 Vpp

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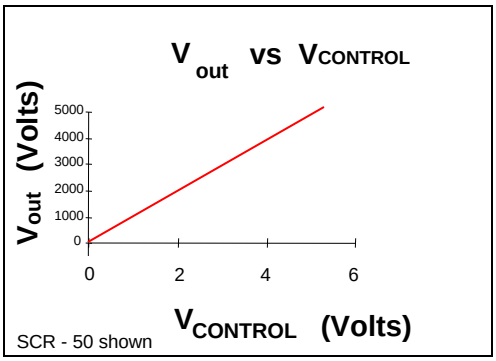
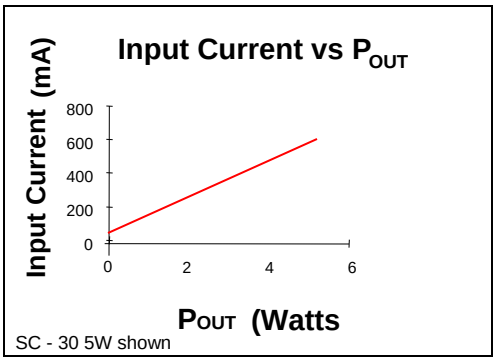
SCR Series Performance Charts



SCR - 50 shown



SC - 30 5W shown

SCR Series Application Notes

The SC Series high voltage power supplies require an input voltage of 12 VDC to operate. They can be programmed by either an external resistance or an external voltage. Figure 1 below shows the basic hookup using the internal reference as the source of the programming voltage. By connecting the Vcontrol pin to the 5.0 volt internal reference pin the maximum output voltage of the power supply is obtained. This voltage 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 which is usually 5 Watts. For standard 12 VDC input models, the input line may vary from 10.8 VDC to 13.2 VDC and the output voltage will remain regulated. 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.

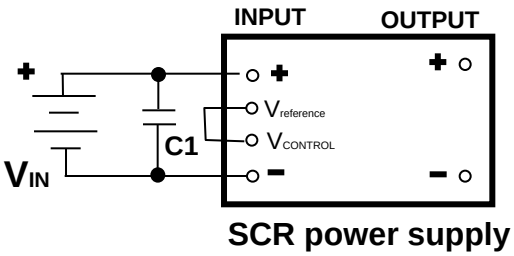


Figure 1: Basic SCR hookup schematic for maximum output (top view of SCR shown)

The output voltage of the SCR unit may be reduced in value by placing a voltage lower than the 5.0 volt reference voltage onto the Vcontrol pin. By placing a voltage of +2.5 VDC onto the control voltage pin the output will be reduced in half. Figure 2 details a simple method of using an external voltage source to vary the output voltage of the SCR power supply. Typical values of input impedance for the SCR series are 10K Ohms. This makes programming via a DAC or operational amplifier an easy chore for the SCR power supply. The control voltage is referenced to the input ground. In this power converter there is an internal connection between the input ground and the output ground. Due to the tight regulation capability, this is NOT a floating output power supply.

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SCR Series Application Notes (continued)

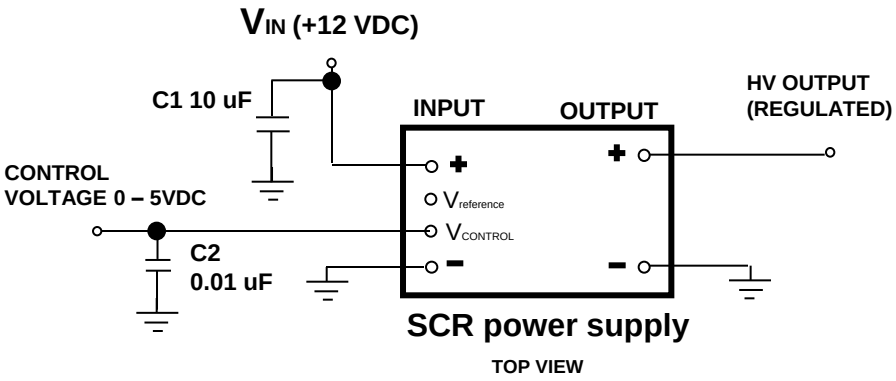
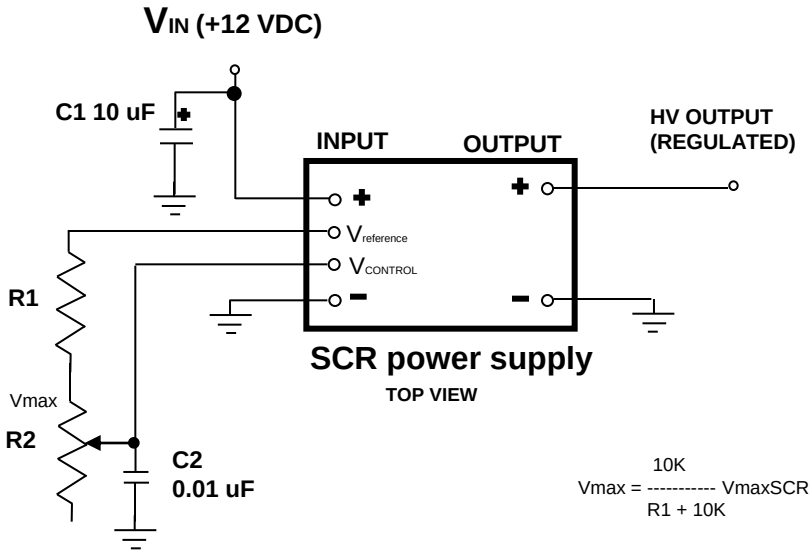


Figure 2: Voltage programming

Capacitor C1 removes switching spikes from the input line and C2 is an AC bypass to insure smooth voltage control levels.

The SCR power supply may also be programmed by using a simple trimpot and the internal +5.0 volt reference. Figure 3 shows this topology. Because the input impedance of the control voltage pin is 10K Ohms, the output of the SCR may be controlled between minimum and maximum values using the formulas given.



$$Vmax = \frac{10K}{R1 + 10K} VmaxSCR$$

$$Vmin = \frac{10K}{R1 + R2 + 10K} VmaxSCR$$

Figure 3: Resistance Programming

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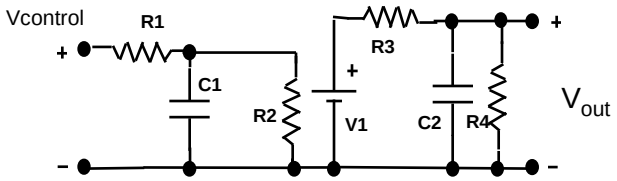
Equivalent SCR Circuit Model



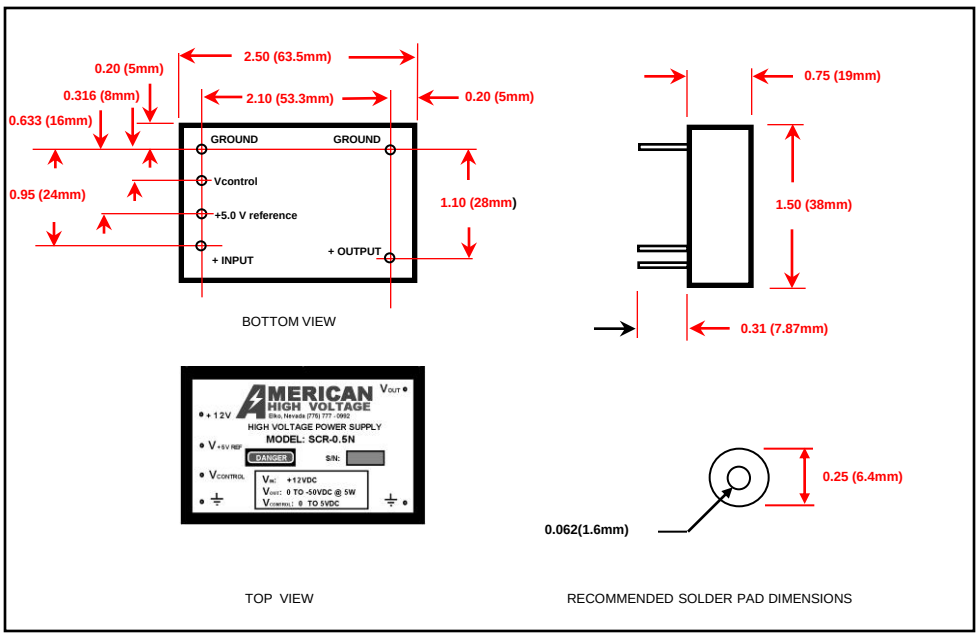
Equivalent SCR HVPS Circuit Model

R1 = 100 *Ohms*
R2 = 10K *Ohms*
R3 = (0.01 x Vout $_{max}$) *Ohms*
R4 = (10 x Vout $_{max}^{2}$) *Ohms*
C1 = (47 x 10^{-6}) *Farads*
C2 = (0.01 x $Iout_{max}$ / $Vout_{max}$) *Farads*
V1 = (V_{R2} x $Vout_{max}$ / 5.0) *Volts*

For example, for an SCR - 5:

Vout**max** = 500 V
Pout**max** = 5 W
Iout**max** = 0.01 A
R1 = 100 Ohms
R2 = 10K Ohms
R3 = 5 Ohms
R4 = 2.5 Megohm
C1 = 47 uF
C2 = 0.2 uF

Outline Drawing: (inches (millimeters))



Ordering Information:

SC – XX Y Watt / Z

XX = Output voltage
Y = Maximum power
Z = Input voltage (blank if 12VDC)

Example:

SC – 30 5W: Maximum output = 3,000 V 5 Watts 12 VDC input
SC – 30 3W/5V: Maximum output = 3,000 V 3Watts 5VDC input