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SLR Series
Precision High Voltage Power Supply

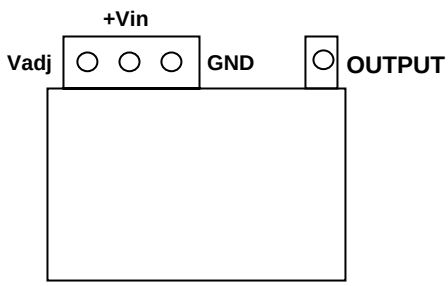
General Description

The SLR Series high voltage power supplies are extremely well regulated sources of high voltage which offer low ripple and EMI. They are ideal for PMT and other noise sensitive applications. They provide outputs of up 5kV and are rated at 10 Watts of power. The output voltage of the SLR 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. Both positive and negative output SLR power supplies are available. Each power supply may be programmed down to zero volts output and offer 0.001% line and load regulation. All SLR's are reverse input voltage and short circuit protected and offer a low cost alternative to other power supplies costing twice as much.

Features

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

Connection Diagram



Mounting holes on back

Available Models:

Name	Maximum Output Voltage	Maximum Output Current	1st Year
SLR – 1P	1,000	10 mA	1998
SLR – 1.5P	1,500	7 mA	2003
SLR – 2P	2,000	5 mA	1995
SLR – 5P	5,000	2 mA	1990
SLR – 1N	1,000 (negative polarity)	10 mA	2002
SLR – 1.5N	1,500 (negative polarity)	7 mA	1993
SLR – 2N	2,000 (negative polarity)	5 mA	1978
SLR – 5N	5,000 (negative polarity)	2 mA	2005

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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)		21	24	27	VDC
Input Current:	No Load:		145	150	175	mA
	Full Load:		600	650	700	mA
Output Ripple:	No Load (all models): Full Load (all models):		0.0005% 0.0008%	0.0006% 0.0008%	0.0007% 0.001%	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%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT\ (ideal)}}$
Output Linearity	Full Load (all models):			0.01%		$\frac{\Delta V_{OUT}}{\Delta V_{OUT\ (Ideal)}}$
Short Circuit Current:				200	300	mA
Power Efficiency:	Full Load		50%	60%	65%	$\frac{P_{OUT}}{P_{IN}}$
Reverse Input Polarity	Protected to 50 VDC					
Temperature Drift:	No Load Full Load				20 20	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	127L x 44.5W x 95.3H	mm
	English	5.0L x 1.75W x 3.75H	inches
Volume:	MKS	538.6	cm^3
	English	32.8	$inch^3$
Mass:	MKS	875	grams
	English	31	oz
Packaging:	Epoxy		
Finish	Black anodized aluminum		
Terminations: Input:	Electro Plated Brass terminals		
Output:	Electro Plated Brass Terminal		

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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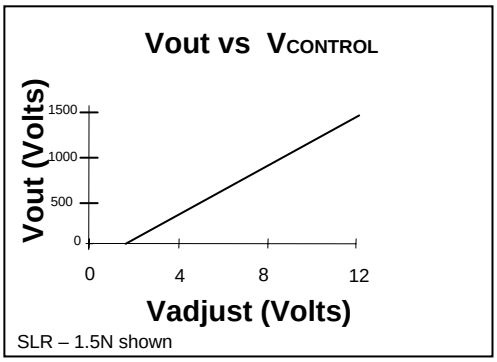
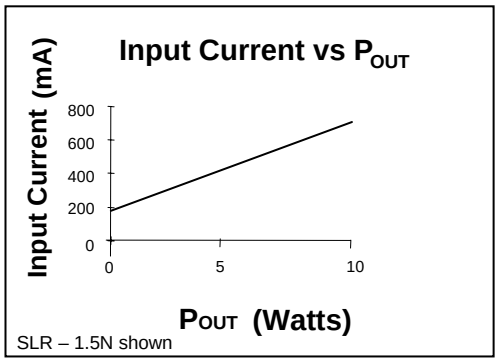
SLR Series Performance Charts



SLR – 1.5N shown



SLR – 1.5N shown

SLR Series Application Notes

The SLR Series high voltage power supplies are powered by an input voltage of 24 VDC. They can be either 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 unit trimpot located at the top of the power supply. The voltage adjust pin is left floating 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 SLR 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.

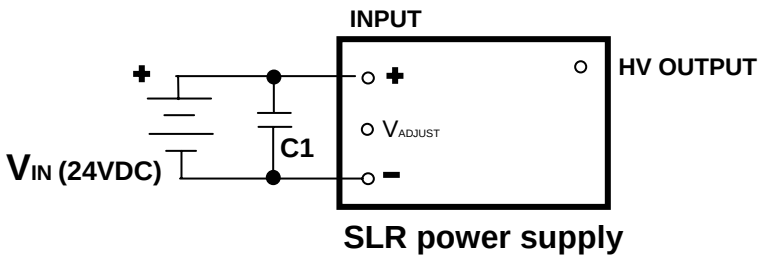


Figure 1: Basic SLR hookup schematic for maximum output

The output voltage of the SLR unit may be reduced in value by placing a voltage lower than +13.0 volts onto the voltage adjust pin. By placing a voltage of lower than +2.0 volts onto this pin, the output voltage of the power supply will be reduced to zero. Impedance of the voltage adjust pin is approximately 50 KOhms. Figure 2 details a simple method of using an external voltage source to vary the output voltage of the TCR power supply. This makes programming via a DAC or operational amplifier an easy chore for the SLR power supply. The control voltage is referenced to the input ground. There exists an internal connection between the input ground and output ground in all SLR power supplies.

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SLR Series Application Notes (continued)

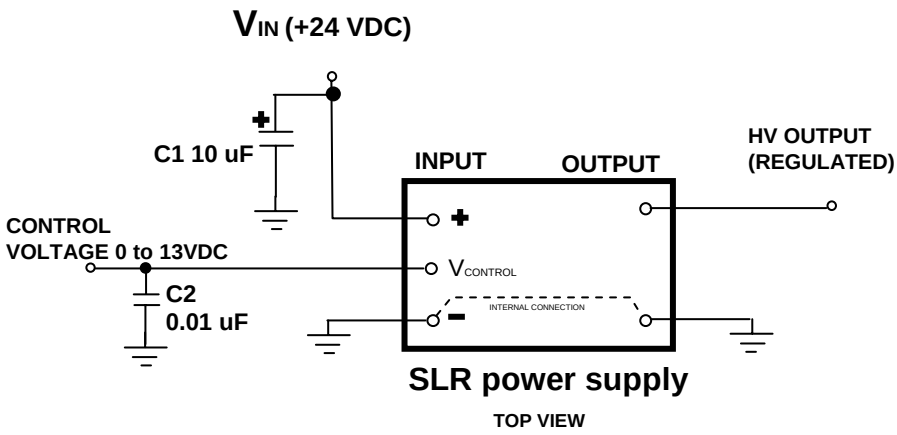
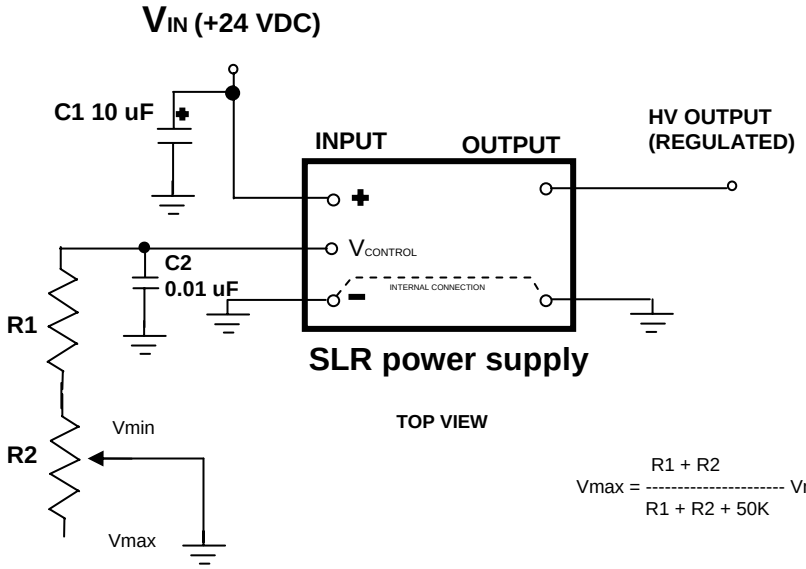


Figure 2: Voltage programming

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

The SLR power supply may also be programmed by using a simple trimpot. Figure 3 shows this topology. Because the input impedance of the control voltage pin is 50K Ohms, the output of the SLR may be controlled between minimum and maximum values using the formulas given.



$$V_{max} = \frac{R1 + R2}{R1 + R2 + 50K} V_{max SLR}$$

$$V_{min} = \frac{R1}{R1 + 50K} V_{max SLR}$$

Figure 3: Resistance Programming

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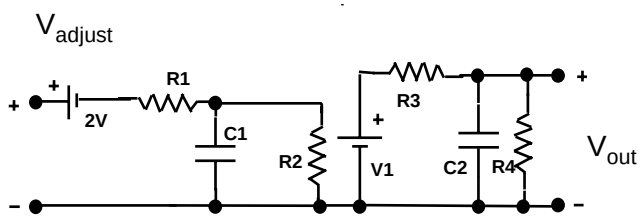
Equivalent SLR Circuit Model

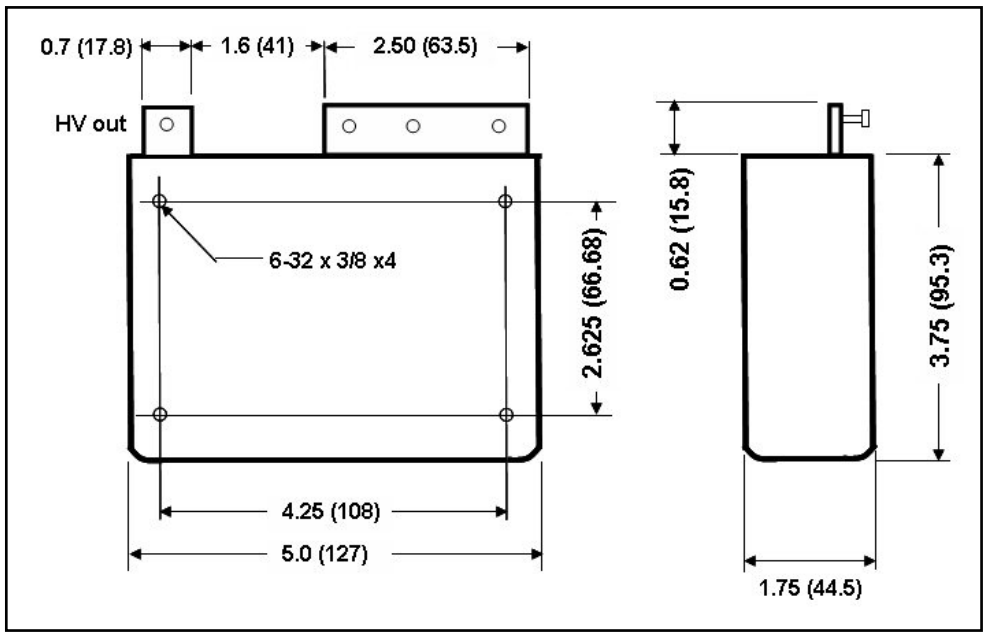


Equivalent SLR-XP High Voltage Power Supply Circuit Model

R1 = (100) *Ohms*
R2 = (50 K) *Ohms*
R3 = (0.002 x $Vout_{max}$) *Ohms*
R4 = (10 x $Vout_{max}^2$) *Ohms*
C1 = (0.01 x 10^{-6}) *Farads*
C2 = (0.04 x $Iout_{max}$ / $Vout_{max}$) *Farads*
V1 = (V_{R2} x $Vout_{max}$ / 11.0) *Volts*

For SLR-2P:
Vout max = 2,000 *V*
Ioutmax = 0.005 A
Pout max = 10 W
R1 = 100 Ohms
R2 = 50 K Ohms
R3 = 4 Ohms
R4 = 40 Megohms
C2 = 0.1 uF

Outline Drawing: (inches (millimeters))



Ordering Information:

SLR – XXY

Example:

SLR – 2P: Maximum output = 2,000 V positive polarity
SLR – 1.5N: Maximum output = 1,500 V negative polarity

XX = Output voltage: 1 = 1 kV
Y = Polarity 1.5 = 1.5 kV
2 = 2 kV
5 = 5 kV