AMERICAN HIGH VOLTAGE
POWER SUPPLIES FOR THE WORLD

V Series
High Voltage Power Supply

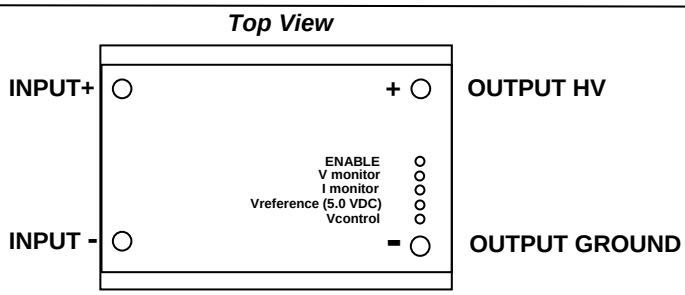
General Description

The V Series high voltage power supplies are 100 Watt high voltage power modules. They offer floating output regulated to greater than 0.1%. V modules are both voltage and resistance programmable down to 30% of the maximum output voltage. In addition a user adjustable multi-turn trimpot is available for setting the maximum output voltage. All V units have internal filtering which reduces conducted emissions on the input line. The output is protected against short circuits by a 2 second "try again" slo-start circuitry.

Features

- 100 Watts output power to 5kV
- Encapsulated
- High Efficiency 80% typical
- Many input voltages (12V, 24V, 115VAC)
- Regulated and programmable

Connection Diagram
(DC input unit shown)



Available Models: (Input voltages available: 12 VDC, 24 VDC, 120 VAC, 240 VAC)

Name	Maximum Output Voltage	Maximum Output Current	1st Year
V - 1	100	1 Ampere	2006
V - 2	200	500 mA	2003
V - 3	300	333 mA	2001
V - 4	400	250 mA	2002
V - 5	500	200 mA	2003
V - 10	1,000	100 mA	2001
V - 20	2,000	50 mA	1999
V – 50	5,000	10 mA	2005

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Electrical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value			Units
		Min	Typical	Max	
Supply Voltage*:	- 12 VDC model	10.8	12	15	VDC
	-24 VDC model	21.6	24	30	VDC
	-120 VAC model	108	120	132	VAC
	-250 VAC model	216	240	264	VAC
Input Current:	No Load (-12 VDC model):	90	100	150	mA
	No Load (-24 VDC model):	90	80	120	mA
	No Load (-120 VAC model):	100	125	150	mA
	No Load (-240 VAC model):	65	75	85	mA
	Full 100 W Load (-12 VDC model):	10.5	11	11.5	Amperes
	Full 100 W Load (-24 VDC model):	5.3	5.5	6	Amperes
	Full 100 W Load (-120 VAC model):	1.05	1.1	1.25	Amperes
	Full Load (10W model);	0.55	0.6	0.7	Amperes
Output Ripple:	No Load (all models):	0.4 %	0.5%	0.5 %	Vpp
	Full Load (all models):	0.8 %	1 %	1.5 %	Vpp
Load Regulation:	No Load to Full Load	0.08 %	0.1 %	0.1 %	V_{NL}/V_L
	Half Load to Full Load	0.08 %	0.1 %	0.1 %	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:	-12 VDC model:	try again		18	Amperes
	-24 VDC model	try again		10	Amperes
	-120 VAC model:	try again		2	Amperes
	-240 VAC model:	try again		1	Ampere
Power Efficiency:	Full Load	68%	75%	80%	$\frac{P_{OUT}}{P_{IN}}$
Temperature Drift:	No Load			200	ppm/DegC
	Full Load			200	ppm/Deg C
Thermal Rise:	No Load (case)			15	degrees C
	Full Load (case)			35	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, 28VDC and 48VDC

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Electrical Characteristics

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Parameter	Conditions	Value			Units
		Min	Typical	Max	
Vcontrol impedance	Open circuit		10K		Ohms
Isolation	Vin return to Vout ground		1,000		Volts
Vmonitor*	Units with output ≤ 1,000 volts Units with output > 1,000 volts		100:1 1,000:1		Vout/Vmon Vout/Vmon
I monitor*	Units with output ≥ 100 mA Units with output < 100 mA		-10:1 -100:1		Imon/Iout Imon/Iout
Enable Pin*	Unit enabled Unit shut off		> 2.5 < 0.5		VDC VDC
Internal Trimpot	Resistance		10K		Ohms
Trimpot adjustment	Minimum output (Vcon = Vref) Maximum output (Vcon = Vref)		30% 100%		Vmax Vmax
Try-again	Current trip point Oscillation period	125%	 2		Imax seconds
Reference*	Output Current max Thermal drift	4.95	5.00 10 100	5.05	VDC mA ppm/deg C

* With respect to output ground

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Physical Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Dimensions (case)	MKS	76.2 W x 146.1L x 41.28H	mm
	English	3 W x 5.75 L x 1.625 H	inches
Volume:	MKS	460	cm^3
	English	28.03	$inch^3$
Mass:	MKS	900	grams
	English	32	oz
Packaging:	Solid Epoxy Thermosetting		
Finish	Smooth Dial-Phthalate Case		
Terminations:	Gold Plated Brass pins (5)	Control and Monitor pins	
	6-32 Machine screw (2)	Power input	
	0.1" Teflon Terminals (2)	HV output	

Environmental Characteristics

(at 25 degrees C unless otherwise specified)

Parameter	Conditions	Value	Units
Temperature Range	base plate temperature	-40 degrees to + 71 degrees	Celsius
	base plate 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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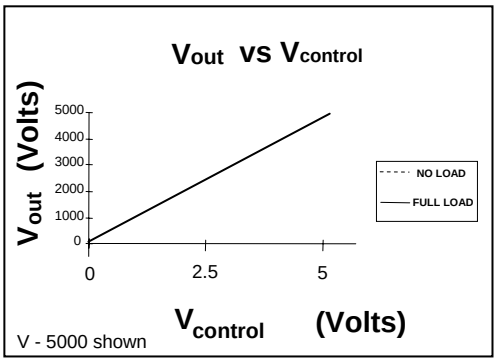
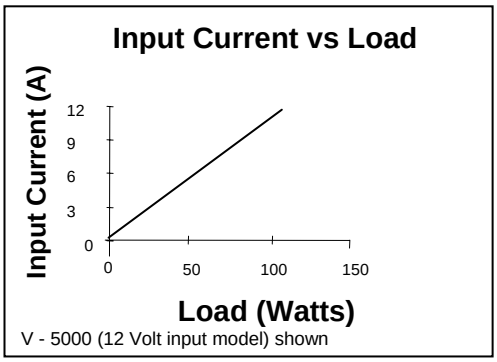
V Series Performance Charts



V - 5000 shown



V - 5000 (12 Volt input model) shown

V Series Application Notes

The V Series high voltage power supplies are driven by a variety of different input voltages depending upon model. Standard input voltages are 12 VDC, 24 VDC, 120 VAC and 240 VAC. All models have efficiencies that approach 80% at full load. There are NO internal connections between the input and output pins. As can be seen from the above, the output voltage is approximately linear with respect to control voltage which is placed into the Vcontrol pin. As shown in Figure 1 below, the easiest operation of the V series is made by utilization of its own 5.0 VDC internal reference. By connecting the reference pin to the Vcontrol pin, full output may be obtained. This output may be adjusted down by turning the user accessible trimpot located on the output side of the power supply. This 20 turn trimpot may be used to lower down the output voltage to less than 30% of maximum. Capacitor C1 is utilized to reduce conducted emissions from appearing on the input power line. Values of 10 uF to 100 uF are common. The unit may be shut off by connecting the ENABLE pin to output ground.

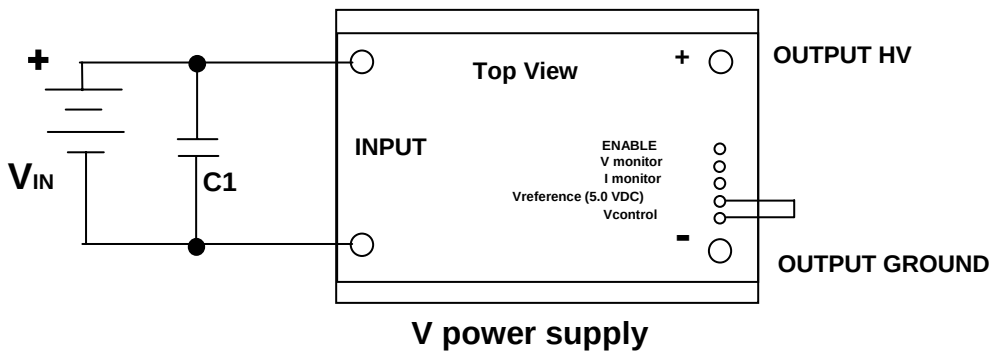


Figure 1: Basic V hookup schematic (12 VDC input model shown)

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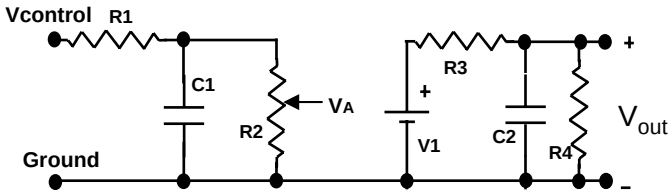
Equivalent V Circuit Model



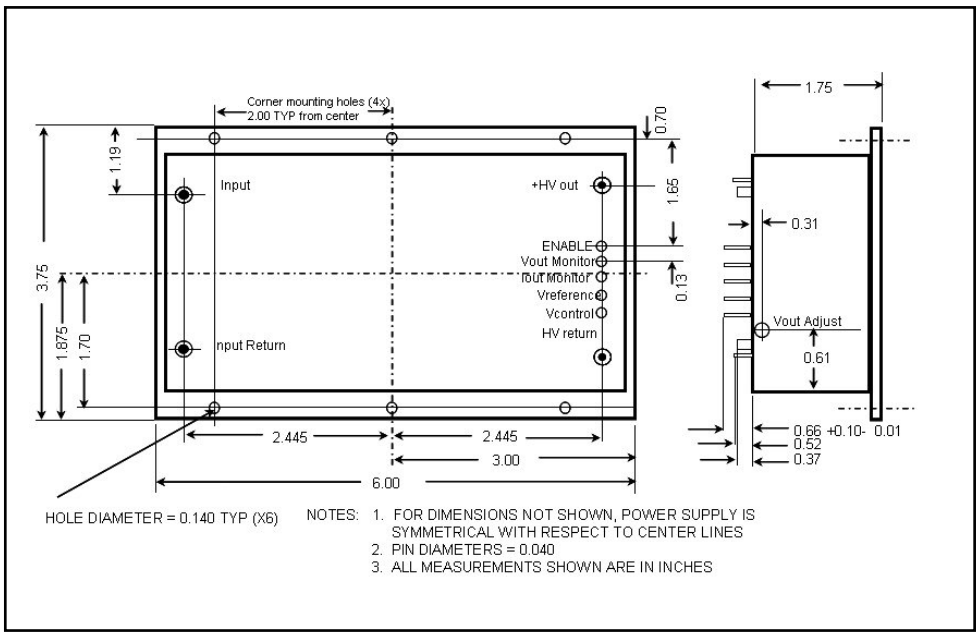
Equivalent V series HVPS Circuit Model

R1 = 100 *Ohms*
R2 = 10K *Ohms*
R3 = (0.001 x Vout $_{max}$ / Iout $_{max}$) *Ohms*
R4 = (6.25 x Vout $_{max}^{2}$) *Ohms*
C1 = (1 x 10^{-2}) *Farads*
C2 = (0.05 x Iout$_{max}$ / Vout$_{max}$) *Farads*
V1 = (VA x Vout$_{max}$ /5) *Volts*

For example, for an V – 4:

Vout**max** = 400 V
Pout**max** = 100 W
Iout**max** = 0.025 A
R1 =100 Ohms
R2 = 10K Ohms
R3 = 16 Ohms
R4 = 1 Megohm
C1 = 10,000 uF
C2 = 1 uF

Outline Drawing: (inches)



Ordering Information:

V – XX / Z

XX = Output voltage
Z = Input voltage

Example:

V – 3 12Vin Maximum output = 300 V 12 VDC input
V – 30 120V Maximum output = 3,000 V 120VACinput