KR Series 3 KW Regulated High Voltage DC Power Supplies

2 kV to100 kV Rack Mount 7.0 Inch Panel Height…

Power Factor Corrected to 0.99

Low Ripple and Harmonic Levels

CE and Semi S2-93 Compliant

Fully RoHS Compliant

The KR Series of 3 kW high voltage supplies feature flexible embedded controls with low ripple and noise. They are air insulated, fast response units, with tight regulation and extremely low arc discharge currents.

Please refer to Technology > Applications page on our web site for typical applications.

The KR Series are fully compliant with the following European Directives:
EN61010/ IEC61010, Safety
EN61000-6-4, Conducted and Radiated Emissions
EN61000-6-2, Conducted and Radiated Immunity
2011/65/EU, Restriction of the use of Hazardous Substances (RoHS)

Models from 0 to 2 kV through 0 to 100 kV, 7.0" H x 24" D, 44 lbs.

Features:

Arc Quench. The HV output is inhibited for a short period after each load arc to help extinguish the arc.

Arc Count. Internal circuitry constantly senses and integrates arcs that occur over a given time. In the event a system or load arcing problem develops and exceeds factory-set parameters, the power supply will cycle off in an attempt to clear the fault and then automatically restart after a preset "off dwell time".

Pulse-Width Modulation. Off-the-line pulse-width modulation provides high efficiency and a reduced parts count for improved reliability.

Embedded Microcontroller control. Front panel digital encoders provide high resolution local adjustment of voltage and current program. Integral RS-232, USB and optional ethernet communications provide remote control program and monitor.

Low Ripple. Typically, ripple is less than 0.05% RMS of rated voltage at full load.

Air Insulated. The KR Series features "air" as the primary dielectric medium. No oil or encapsulation is used to impede serviceability or increase weight.

Constant Voltage/Constant Current Operation. Automatic crossover from constant-voltage to constant-current regulation provides protection against overloads, arcs, and short circuits.

Redundant Thermal Overload Protection. Thermostats and fan RPM sensing shut down the power supply due to over temperature or reduced fan speeds.

Tight Regulation. Voltage regulation is better than 0.005% for allowable line and 0.01% for allowable load variations. Current regulation is better than 0.1% from short circuit to rated voltage.

Constant Current/Current Trip. A rear panel switch allows selection of either current mode.

Slow Start. Adjustable ramp time from 0 - 30 seconds. Output ramps from 0 V to programmed voltage level.

Warranty. All power supplies are warranted for one year. A formal warranty statement is available.

Specifications

(Specifications apply from 5% to 100% rated voltage. Operation is guaranteed down to zero voltage with a slight degradation of performance.)

Input: 187 - 264 VAC continuous sin-

gle-phase, 48-63 Hz. The RMS input current at rated power is less than 20 A and inrush current is less than 35 A peak across the input line voltage range.

Efficiency: Typically greater than 85% at full load.

Power Factor: 0.99 typical at full load.

Output: Continuous, stable adjustment, from 0 to rated voltage or current by panel mounted optical rotary encoder or by external +10V signals. Voltage accuracy is 0.5% of setting + 0.2% of rated. Optical rotary encoder resolution: 0.025% with "Fine Adjustment" mode selected. 0.25% with "Coarse Adjustment" mode (default). Repeatability is < 0.1% of rated.

Static Voltage Regulation: Better than ±0.005% for specified line variations and 0.01% + 0.5 mV/mA for no load to full load variations.

Dynamic Voltage Regulation: For load transients from 10% to 99% and 99% to 10%, typical deviation is less than 3% of rated output voltage with recovery to within 1% in 500 us and recovery to within 0.1% in 1 ms.

Ripple: Better than 0.05% of rated voltage + 1 V RMS at full load.

Current Regulation: When in current regulation mode, better than 0.1% for 8-100 kV and better than 0.2% for 2-6 kV from short circuit to rated voltage at any load condition.

Voltage Monitor: 0 to +10 V equivalent to 0 to rated voltage. Accuracy: 0.5% of reading + 0.2% of rated. Impedance is 10 KΩ.

Current Monitor: 0 to +10 V equivalent to 0 to rated current. Accuracy: 1% of reading + 0.1% of rated. Impedance is 10 KΩ.

Stability: 0.01% per hour after 1/2 hour warm-up, 0.05% per 8 hours.

Voltage Rise/Decay Time Constant: The voltage rise time constant is 50 ms typical for 2 to 20 kV models and 200 ms typical for 25 to 100 kV models using either HV enable or remote programming control. The voltage decay time constant is 50 ms with a 15% resistive load for 2 to 20 kV models and 200 ms with a 7.5% resistive load for 25 to 100 kV models.

Temperature Coefficient: 0.01% /°C.

Ambient Temperature: -20 to +40° C, operating; -40 to +85° C, storage.

Polarity: Available with either positive, negative or reversible polarity with respect to chassis ground.

Protection: Automatic current regulation protects against all overloads, including arcs and short circuits. Thermal switches and RPM sensing fans protect against thermal overload. Fuses, surge-limiting resistors, and low energy components provide ultimate protection.

Arc Quench: An arc quench feature provides sensing of each load arc and quickly inhibits the HV output for approximately 20 ms after each arc. Standard on 8 to 100 kV models; optional on 2 to 6 kV models.

Arc Count: Internal circuitry senses the number of arcs caused by external load discharges. If the rate of consecutive arcs exceeds approximately one arc per second for five arcs, the supply will turn off for approximately 5 seconds to allow clearance of the fault. After this period the supply will automatically return to the programmed kV value with the rise time constant indicated. If the load fault still exists, the above cycle will repeat. Standard on 8 to 100 kV models; optional on 2 to 6 kV models.

External Interlock: Open = off, closed = on. Normally latching except for blank front panel version where it is non-latching.

Remote HV Enable/Disable: 0 - 1.5 V = OFF, 2.5 - 15 V = ON.

RS232/USB/Ethernet Programming and Monitor Accuracy:

Resolution: 0.025% of full scale for both the voltage and the current programs. 0.1% of full scale for both the voltage and the current monitors

Remote setting accuracy: Voltage setting accuracy is better than 0.5% of setting + 0.2% of rated.

Remote reading accuracy: Voltage reading accuracy is 0.5% of reading + 0.2% of rated. Current reading accuracy is 1% of reading + 0.1% of rated.

Front Panel Elements.

Output Voltage & Current Display: 3.5 Digit digital meters. 1250 count maximum.

Indicators: AC Power, Current Mode, Voltage Mode, Pol +, Pol -, Fault, Fine Adjustment, Preset, Control Lock, Remote Enable, Remote Program, HV On.

AC Power: Rocker switch

Switches (momentary): HV On, SS Slope, Standby, Remote Enable, Remote Program, Preset, Fine Adjust, Control Lock.

Rotary Encoders: Voltage Adjust, Current Adjust..

Rear Panel Elements. AC power entry connector IEC 60320-C20 inlet, power on indicator, ground stud, HV output connector, remote interface connector and RS232/USB connectors.

The signals provided on the remote interface connector are as follows:

Inputs: Safety interlock, output voltage and current program signals, high voltage enable and remote HV on.

Outputs: Output voltage and current monitor signals, HV status, fault status, I/V mode status and a +10 V reference source.

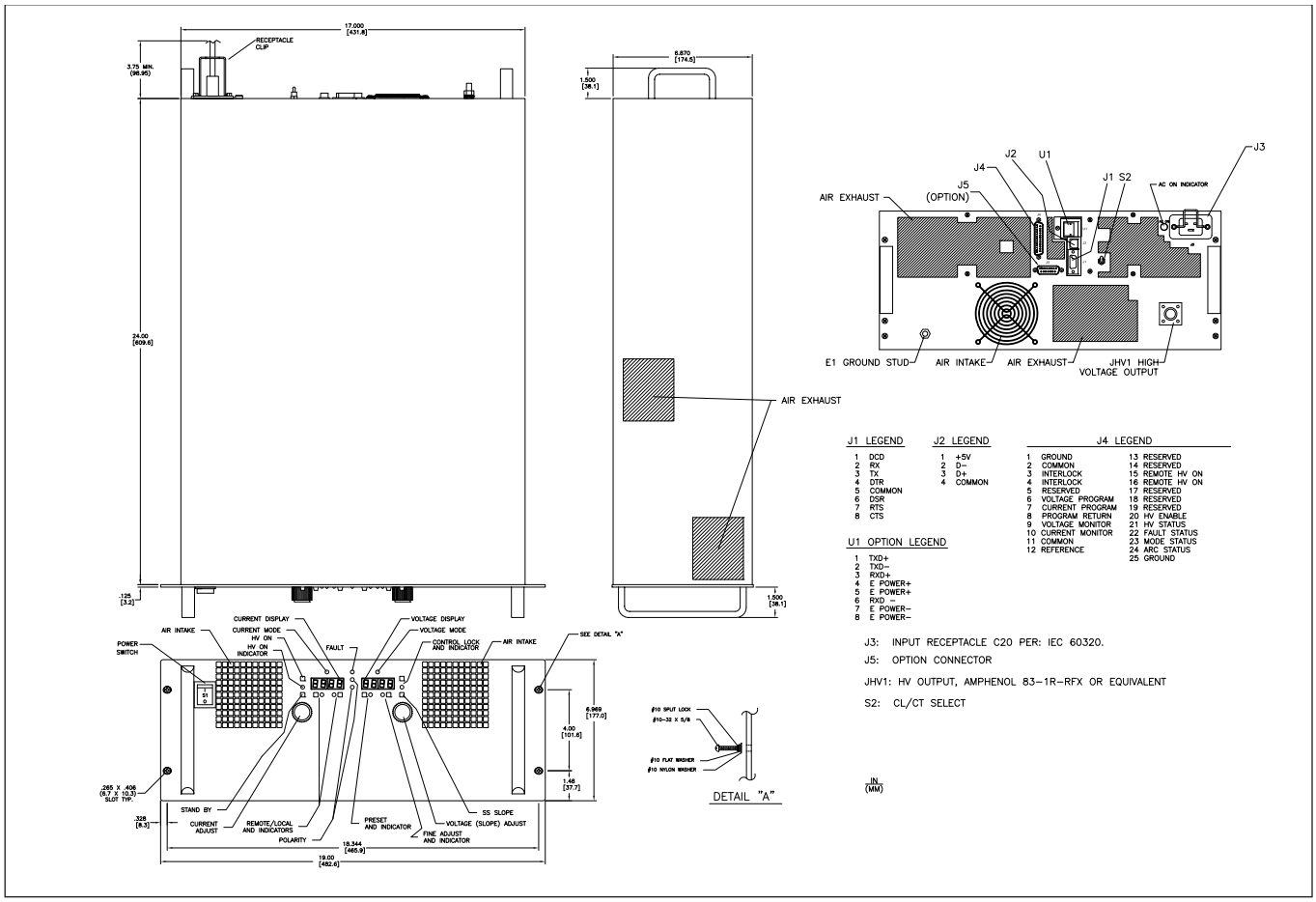
Signal common and ground reference terminals are also provided.

Accessories: Detachable, 8 foot, shielded high voltage coaxial cable (see models chart for cable type), 6 foot NEMA 6-20P line cord, 10 foot null modem cable and 10 foot USB cable are provided.

Weight: Approximately 44 lbs.

Options

Symbol	Description
200	180-220 VRMS input, 48 - 63 Hz. Derate output current by 10%.
NC	Blank front panel, power switch and indicator only.
ZR	Zero start interlock. Voltage control, local or remote, must be at zero before the HV will enable.
5VC	0-5 V voltage and current program/monitor.
ARC	Arc count and quench as described in the specifications for 2 - 6 kV models.
AC	Arc Count Only
AQ	Arc Quench Only
ETH	Virtual RS-232 COM port over Ethernet network. (Requires compatible OS (eg Windows) for COM drivers)

Models

Positive Polarity	Negative Polarity	Reversible Polarity	Output Voltage	Output Current	MaxStored Energy	Output Cable
Reversible Polarity Only		KR2R1.5	0 - 2kV	0 - 1.5A	1.5J	RG-8U
		KR3R1.0	0 - 3kV	0 - 1.0A	2.1J	RG-8U
		KR5R600	0 - 5kV	0 - 600mA	1.7J	RG-8U
		KR6R500	0 - 6kV	0 - 500mA	2.3J	RG-8U
KR8P375	KR8N375	KR8R375	0 - 8kV	0 - 375mA	4.8 J	RG-8U
KR10P300	KR10N300	KR10R300	0 - 10kV	0 - 300mA	7.5 J	RG-8U
KR12P250	KR12N250	KR12R250	0 - 12kV	0 - 250mA	3.6 J	RG-8U
KR15P200	KR15N200	KR15R200	0 - 15kV	0 - 200mA	5.6 J	RG-8U
KR20P150	KR20N150	KR20R150	0 - 20kV	0 - 150mA	10.0 J	RG-8U
KR25P120	KR25N120	KR25R120	0 - 25kV	0 - 120mA	4.6 J	DS2124
KR30P100	KR30N100	KR30R100	0 - 30kV	0 - 100mA	6.8 J	DS2124
KR40P75	KR40N75	KR40R75	0 - 40kV	0 - 75mA	8.8 J	DS2124
KR50P60	KR50N60	KR50R60	0 - 50kV	0 - 60mA	10.3 J	DS2124
KR60P50	KR60N50	KR60R50	0 - 60kV	0 - 50mA	12.3 J	DS2124
KR70P43	KR70N43	KR70R43	0 - 70kV	0 - 43mA	14.4 J	DS2124
KR80P38	KR80N38	KR80R38	0 - 80kV	0 - 38mA	16.4 J	DS2124
KR100P30	KR100N30	KR100R30	0 - 100kV	0 - 30mA	20.5 J	DS2124