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5 kV Voltage Power Supply Characteristics

CONDITIONS

This document contains specifications and supplemental information for the Model 2290-5 High Voltage Power Supply. Specifications are the standards against which the Model 2290-5 is tested. Upon leaving the factory, the Model 2290-5 meets these specifications. Characteristics, supplemental characteristics, and typical values are not warranted, apply at 23 °C ± 5 °C, < 70% relative humidity, and are provided solely as useful information.

CHARACTERISTICS

Voltage range:		
Output voltage¹	Maximum output current	Conditions
50 to +5000 V dc	5.000 mA DC	No filter
50 to +3000 V DC	5.000 mA DC	Filter 1
50 to +5000 V dc	3.000 mA DC	Filter 2
Voltage set accuracy²: ±(0.01% of setting + 2.5 V)		
Voltage display accuracy: voltage set accuracy ±1 V, typical (±2 V, maximum)		
Voltage resolution: 1 V (set and display)		
Voltage limit range: 0 to 100% full scale		
Voltage regulation³: Line: 0.001% for ±10% line voltage change Load: 0.005% for 100% load change, typical		
Output ripple (10 kHz – 100 kHz)⁴: 0.002% of full scale, V RMS, maximum - No filter 1.0 mV RMS @ 1 kV – Filter 1 or Filter 2 2.0 mV RMS @ 3 kV – Filter 1 or Filter 2 3.0 mV RMS @ 5 kV – Filter 2		
Rise time (full load)^{5, 6}: 1.5 seconds for 0 V setting to within 1 V of 5000 V DC – No filter 3 seconds for 0 V setting to within 1 V of 3000 V DC – Filter 1 4 seconds for 0 V setting to within 1 V of 5000 V DC – Filter 2		

¹ The output voltage can be programmed to a voltage lower than 50 V, however, performance below 50 V is not specified.

² Add ±2.5 V DC when Filter 1 or Filter 2 is enabled.

³ Regulation specifications apply for greater than 25 V DC (with full load), or 50 V DC (with no load). Below these values, the unit may not regulate correctly.

⁴ Peak-to-peak values are within five times the RMS value.

⁵ Current limit set to 105% of full scale.

⁶ Under resistive load.

Specifications are subject to change without notice.

CHARACTERISTICS

Voltage range:
Discharge time (full load)^{5,6}: 1 second for 5000 V DC to 1 V DC – No filter 3 seconds for 3000 V DC to 1 V DC – Filter 1 4 seconds for 5000 V DC to 1 V DC – Filter 2
Discharge time (no load)⁵: <12 seconds (to <50 V DC) – No filter <30 seconds (to <50 V DC) – Filter 1 or Filter 2
Output stored charge: <0.9 mC maximum
Settling time^{5,6}: From 0 to programmed voltage; to within 99.9% of final value within 3 seconds
Recovery time^{5,6}: 120 ms for 40% step change in load current (typical)

Current limit and trip range	Filter
0 mA to 5.25 mA	No filter or Filter 1
0 mA to 3.25 mA	Filter 2
Current set accuracy⁷: $\pm(0.01\%$ of setting + 2.5 μA)	
Current resolution: 1 μA	
Current display accuracy: $\pm 1 \mu\text{A}$, typical ($\pm 2 \mu\text{A}$, maximum)	

Stability: $\pm 0.01\%$ per hour; $< 0.03\%$ per eight hours
Temperature drift: 50 ppm/ $^{\circ}\text{C}$, 0° to 40° C, typical
Protection: Arc and short circuit protected; programmable voltage and current limits and current trip

Monitor outputs
Output scale: 0 to +10 V to full scale
Current rating: 10 mA maximum
Output impedance: $< 1 \Omega$
Accuracy: $\pm 0.2\%$ of full scale with a 100 k Ω load, minimum
Update rate: 8 Hz

⁷ Add 2.5 μA offset when Filter 1 or Filter 2 is enabled.

External voltage set
Input scale: 0 to +10 V for 0 to full scale
Input impedance: 1 M Ω
Accuracy: $\pm 0.2\%$ of full scale
Update rate: 16 Hz
Output slew rate ^{5,6} : $<(\text{Rise time} + 0.3 \text{ seconds})$ for 0 to full range under full load

GENERAL:

Input power: 55 watts
2290-5 Input voltage: 120 V $\pm 10\%$, 50 or 60 Hz
2290E-5 Input voltage: 240 V $\pm 10\%$, 50 or 60 Hz
2290J-5 Input voltage: 100 V $\pm 10\%$, 50 or 60 Hz
Rear panel connectors: SHV male (Kings type 1704-1 or equivalent) Output high-voltage connector GPIB connector BNC Connector (two): Voltage set/Voltage monitor; Current monitor
Toggle switch: Voltage setting or Voltage monitor
High-voltage safety interlock: Connector: 3-pin press-in connector, 3M part number: 37103-A165-00E-MB Pin 1: 5 V nominal out, 1.5 mA maximum out Pin 2: Input: High-voltage output enabled: 3 – 24 V DC High-voltage output disabled: <1.2 V DC or open connection Pin 3: Chassis ground through a 100 Ω resistor
Interface protocol: IEEE-488.1
Operating environment: 0 $^{\circ}$ C to 40 $^{\circ}$ C; non-condensing
Dimensions: 89 mm high x 206 mm wide x 406 mm deep (3.5 in x 8.1 in x 16 in)
Weight: 5.5 kg (12 pounds)
Safety: Conformance to European Union low voltage directive
Warranty: One year
Warm-up time: One hour