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SPECIFICATION CONDITIONS

This document contains specifications for the Series 2230 Triple-Channel Power Supplies. Specifications are the standards against which the Models 2230-30-3, 2230-30-6, and 2230-60-3 are tested. Upon leaving the factory, the Models 2230-30-3, 2230-30-6, and 2230-60-3 meet these specifications. Typical values are not warranted, apply at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, and are provided solely as useful information. Specifications apply under these conditions:

- Temperature $0\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$ and relative humidity 10% to 80% unless defined differently in this document.
- After a 30-minute warmup period.
- Within one year of the calibration period.

MODEL-SPECIFIC SPECIFICATIONS

	2230-30-3		2230-30-6		2230-60-3	
	CH1 and CH2	CH3	CH1 and CH2	CH3	CH1 and CH2	CH3
DC output rating						
Voltage	0 V to 30 V	0 V to 5 V	0 V to 30 V	0 V to 5 V	0 V to 60 V	0 V to 5 V
Voltage Limit	30.1 V	5.1 V	30.1 V	5.1 V	60.1 V	5.1 V
Current	0 A to 3 A	0 A to 3 A	0 A to 6 A	0 A to 3 A	0 A to 3 A	0 A to 3 A
Maximum power	195 W		375 W		375 W	
Load regulation ($23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)						
Voltage	$\pm(0.01\% + 3\text{ mV})$		$\pm(0.01\% + 3\text{ mV})$		$\pm(0.01\% + 3\text{ mV})$	
Current	$\pm(0.01\% + 3\text{ mA})$		$\pm(0.01\% + 3\text{ mA})$		$\pm(0.01\% + 3\text{ mA})$	
Line regulation ($23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)						
Voltage	$\pm(0.01\% + 3\text{ mV})$		$\pm(0.01\% + 3\text{ mV})$		$\pm(0.01\% + 3\text{ mV})$	
Current	$\pm(0.01\% + 3\text{ mA})$		$\pm(0.01\% + 3\text{ mA})$		$\pm(0.01\% + 3\text{ mA})$	
Ripple and noise (20 Hz to 20 MHz, $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$)						
Voltage ($V_{\text{peak-peak}}$)	$<3\text{ mV}_{\text{peak-peak}}$		$<4\text{ mV}_{\text{peak-peak}}$	$<3\text{ mV}_{\text{peak-peak}}$	$<4\text{ mV}_{\text{peak-peak}}$	
Voltage (V_{RMS})	$<1\text{ mV}_{\text{RMS}}$		$<1\text{ mV}_{\text{RMS}}$	$<1\text{ mV}_{\text{RMS}}$	$<1\text{ mV}_{\text{RMS}}$	
Current (I_{RMS})	$<4\text{ mA}$		$<5\text{ mA}$	$<4\text{ mA}$	$<4\text{ mA}$	
Setting resolution						
Voltage	1 mV		1 mV		1 mV	
Current	1 mA		1 mA		1 mA	

Series 2230 DC Programmable Power Supplies Specifications

	2230-30-3		2230-30-6		2230-60-3	
	CH1 and CH2	CH3	CH1 and CH2	CH3	CH1 and CH2	CH3
Setting accuracy (using remote sense, 23 °C ± 5 °C, ±(% of reading + offset))						
Voltage	±(0.03% + 10 mV)		±(0.03% + 10 mV)		±(0.03% + 10 mV)	
Current	±(0.1% + 5 mA)		±(0.1% + 8 mA)	±(0.1% + 5 mA)	±(0.1% + 5 mA)	
Readback resolution						
Voltage	1 mV		1 mV		1 mV	
Current	1 mA		1 mA		1 mA	
Readback accuracy (23 °C ± 5 °C ±(% of reading + offset))						
Voltage	±(0.03% + 10 mV)		±(0.03% + 10 mV)		±(0.03% + 10 mV)	
Current	±(0.1% + 5 mA)		±(0.1% + 8 mA)	±(0.1% + 5 mA)	±(0.1% + 5 mA)	
Temperature coefficient ±(% of output + offset) / °C (between 0 °C to 18 °C and 28 °C to 40 °C)						
Voltage	±(0.01% + 1 mV)		±(0.01% + 1 mV)		±(0.01% + 1 mV)	
Current	±(0.02% + 1 mA)		±(0.02% + 1 mA)		±(0.02% + 1 mA)	
Series setting resolution						
Voltage	1 mV	—	1 mV	—	—	—
Current	1 mA	—	1 mA	—	—	—
Series readback resolution						
Voltage	1 mV	—	1 mV	—	—	—
Current	1 mA	—	1 mA	—	—	—
Parallel setting resolution						
Voltage	1 mV	—	1 mV	—	1 mV	—
Current	1 mA	—	0 A to 9.999 A: 1 mA 10 A to 12 A: 10 mA	—	1 mA	—
Parallel readback resolution						
Voltage	1 mV	—	1 mV	—	1 mV	—
Current	1 mA	—	0 A to 9.999A: 1 mA 10 A to 12A: 10 mA	—	1 mA	—
Rise time (10% to 90%)	≤100 ms		≤100 ms		≤100 ms	
Fall time (90% to 10%)	≤0.5 s	≤0.1 s	≤0.5 s	≤0.1 s	≤1.5 s	≤0.1 s
Load transient recovery time						
Voltage setting band 50 mV, 50% to 100%, 1 kHz, rise and fall rate 5 A per μs: ≤50 μs (typical)						
Transition time						
CC mode to CV mode, V-set = 5 V, I-limit = 0.5 A, resistive load change from 2.5 Ω to 25 Ω: ≤10 ms						
CV mode to CC mode, V-set = 5 V, I-limit = 0.5 A, resistive load change from 25 Ω to 2.5 Ω: ≤5 ms						
Output timer						
Setting range	0.1 s to 99999.9 s		0.1 s to 99999.9 s		0.1 s to 99999.9 s	
Resolution	0.1 s		0.1 s		0.1 s	

Specifications are subject to change without notice

GENERAL SPECIFICATIONS

Communications	<ul style="list-style-type: none"> ▪ USB: Type B connector, USB 2.0, USBTMC compatible ▪ RS232: Baud rates: 4800/9600/19,200/38,400/57,600/115,200
Rear-panel connectors	<ul style="list-style-type: none"> ▪ Output: 15-pin terminal block socket ▪ RS-232: DB-9 connector ▪ USB device: Type B connector ▪ AC power input: 3-prong socket assembly with fuse
Display	Vacuum fluorescent display
Memory	36 setup memories
Output and Remote Sense	<p>Removable 15-pin screw-terminal block carries the following signals:</p> <ul style="list-style-type: none"> ▪ Output channels: Duplicates the front-panel outputs ▪ Remote sense lines: Connections for remote sense for each channel ▪ Control input: Multifunction TTL input, which can function as a trigger input, output control line, or digital input ▪ Status output: Multifunction TTL output, which can function as a fault indication or digital output
Floating voltage rating	Up to 400 V (DC + peak AC) between protective earth (safety ground) and any output terminal
Power source	<ul style="list-style-type: none"> ▪ 110 V ac setting: 2230-30-3: 99 V_{RMS} to 132 V_{RMS} 2230-30-6 and 2230-60-3: 108 V_{RMS} to 132 V_{RMS} with 2230-HRM installed ▪ 220 V ac setting: 198 V_{RMS} to 264 V_{RMS} ▪ Frequency: 50/60 Hz ▪ Power consumption: 2230-30-3: 700 VAC; 2230-30-6 and 2230-60-3: 1000 VAC
EMC	<ul style="list-style-type: none"> ▪ European Union: Conforms to European Union EMC directive ▪ USA: FCC, CFR Title 47, Part 15, Subpart B, Class A ▪ Australia: EMC Framework, demonstrated per Emission Standard AS/NZS 2064 (industrial, scientific, and medical equipment)
Safety	<ul style="list-style-type: none"> ▪ European Union: Conforms to Low Voltage Directive ▪ USA: NRTL listed to UL61010-1-2004 ▪ Canada: CAN/CSA C22.2 No. 61010-1 2004
Dimensions	<ul style="list-style-type: none"> ▪ With boot: 104.2 mm high × 225.3 mm wide × 481.1 mm deep (4.10 in. × 8.87 in. × 18.94 in.) ▪ Without boot: 88.2 mm high × 214.5 mm wide × 456.6 mm deep (3.47 in. × 8.44 in. × 17.98 in.)
Shipping weight	<ul style="list-style-type: none"> ▪ 2230-30-3: 12.3 kg (27 lb) ▪ 2230-30-6 and 2230-60-3: 13.8 kg (30 lb)
Net weight	<ul style="list-style-type: none"> ▪ 2230-30-3: 9.6 kg (21 lb) ▪ 2230-30-6 and 2230-60-3: 11.1 kg (24 lb)
Environment	<ul style="list-style-type: none"> ▪ Altitude: <ul style="list-style-type: none"> ▪ Operating: Up to 2000 meters (6562 ft) above sea level ▪ Storage: Up to 4000 meters (13,124 ft) above sea level ▪ Operating: 0 °C to 40 °C, 10% to 80% relative humidity up to 40 °C ▪ Storage: <ul style="list-style-type: none"> ▪ -20 °C to 70 °C, 10% to 80% relative humidity up to 40 °C ▪ -20 °C to 70 °C, 5% to 60% relative humidity above 40 °C up to 70 °C

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