

**Instruction Manual
Model 197
Autoranging Microvolt DMM**

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Cleveland, Ohio, U.S.A.
Document Number 197-901-01

SPECIFICATIONS

DC VOLTS

RANGE	RESOLUTION	INPUT RESISTANCE	ACCURACY ** ± (%rdg + counts)	
			24 Hr., * 22°-24°C	1 Yr., 18°-28°C
200mV	1 μ V	>1G Ω	0.007 + 2	0.016 + 3
2 V	10 μ V	>1G Ω	0.005 + 2	0.011 + 2
20 V	100 μ V	11M Ω	0.006 + 2	0.015 + 2
200 V	1mV	10M Ω	0.006 + 2	0.015 + 2
1000 V	10mV	10M Ω	0.007 + 2	0.015 + 2

*Relative to calibration accuracy. **When properly zeroed.

NMRR: Greater than 60dB at 50Hz, 60Hz $\pm 0.1\%$.

MAXIMUM ALLOWABLE INPUT: 1000V dc or peak ac (less than 10 seconds per minute on the 200mV and 2V ranges; 300V rms continuous).

SETTLING TIME: 1 second to within 3 counts of final reading on range.

dB MODE (ref: 600 Ω): Accuracy: $\pm(0.02\text{dB} + 1 \text{ count})$ above -78dBm . Resolution: 0.01dB above 0.5% of range.

TRMS AC VOLTS

RANGE	ACCURACY (1 Yr.) 18°-28°C ± (%rdg + counts)				
	20Hz - 50Hz *	50Hz - 10kHz *	10kHz - 20kHz *	20kHz - 50kHz **	50kHz - 100kHz **
200mV	1.00 + 100	0.35 + 100	0.6 + 200	1.5 + 250	5 + 400
2V - 200V	1.00 + 100	0.35 + 100	0.6 + 200	1.5 + 250	3 + 400
750V	1.25 + 100	0.75 + 100	1.0 + 200	1.8 + 250	3 + 400

*Above 1800 counts. **Above 18000 counts.

MAXIMUM ALLOWABLE INPUT: 750V rms, 1000V peak (less than 10 seconds per minute on 200mV and 2V ranges; 300V rms continuous). 10°V•Hz maximum.

3dB BANDWIDTH: 300kHz typical.

INPUT IMPEDANCE: 1M Ω paralleled by less than 75pF on 200V and 750V ranges. 1.1M Ω paralleled by 75pF on 200mV, 2V and 20V ranges. Capacitively coupled.

SETTLING TIME: 1 second to within 0.1% of final reading on range.

RANGE	INPUT	ACCURACY (± dBm)			
		20Hz - 10kHz	10kHz - 20kHz	20kHz - 50kHz	50kHz - 100kHz
2V - 750V	200mV to 750 V (-12 to 59.8dBm)	0.18	0.18	0.28	0.50
200mV	20mV to 200mV (-32 to -12dBm)	0.18	0.18	0.28	0.65
	2mV to 20mV (-52 to -32dBm)	0.85	1.10	2.00	—
	1mV to 2mV (-58 to -52dBm)	2.00	3.00	—	—

RESOLUTION: 0.01dB above 0.5% of range.

DC AMPS

RANGE	RESOLUTION	MAXIMUM VOLTAGE BURDEN	ACCURACY (1 Yr.) 18°-28°C ± (%rdg + counts)	
			24 Hr., * 22°-24°C	1 Yr., 18°-28°C
200 μ A	1nA	0.3V	0.1 + 15**	0.1 + 15
2mA	10nA	0.3V	0.1 + 15	0.1 + 15
20mA	100nA	0.3V	0.1 + 15	0.1 + 15
200mA	1 μ A	0.3V	0.2 + 15	0.2 + 15
2000mA	10 μ A	0.8V	0.2 + 15	0.2 + 15
10 A	100 μ A	0.3V	0.75 + 15*	0.75 + 15*

*Above 5A derate 0.15% rdg per amp for self-heating.

**When properly zeroed.

OVERLOAD PROTECTION: mA Input: 2A fuse (250V), externally accessible. 10A Input: 20A for 15s, unfused.

SETTLING TIME: 1 second to within 3 counts of final reading.

TRMS AC AMPS

RANGE	MAXIMUM VOLTAGE BURDEN	ACCURACY (1 Yr.) * 18°-28°C ± (%rdg + counts)		
		20Hz - 50Hz	50Hz - 10kHz	10kHz - 30kHz
200 μ A - 20mA	0.3V	1.0 + 100	0.8 + 100	2 + 250
200mA	0.3V	1.0 + 100	0.8 + 100	—
2000mA	0.8V	1.0 + 100	0.8 + 100	—
10 A	0.3V	1.5 + 100**	1.0 + 100**	—

*Above 1800 counts. **1kHz max. Above 5A derate 0.15% rdg/amp for self-heating.

SETTLING TIME: 1 second to within 0.1% of final reading.

OHMS

RANGE	RESOLUTION	NOMINAL I-SHORT	OUTPUT MAX V ACROSS UNKNOWN	ACCURACY ± (%rdg + counts)	
				24 Hr., 22°-24°C	1 Yr., 18°-28°C
200 Ω	1m Ω	2mA	0.5V	0.01 + 2*	0.02 + 3*
2 k Ω \rightarrow \rightarrow	10m Ω	2mA	4.0 V	0.01 + 2	0.018 + 2
20 k Ω	100m Ω	400 μ A	4.0V	0.014 + 2	0.026 + 2
200 k Ω \rightarrow \rightarrow	1 Ω	40 μ A	4.0V	0.014 + 2	0.026 + 2
2M Ω **	10 Ω	4 μ A	4.0V	0.02 + 2	0.035 + 2
20M Ω **	100 Ω	400 nA	4.0V	0.10 + 2	0.12 + 2
200M Ω **	10 k Ω	400 nA	5.0V	2.00 + 1	2.00 + 1

*When properly zeroed. **Appropriate range selected automatically in M Ω .

CONFIGURATION: Automatic 2- or 4-terminal.

MAXIMUM ALLOWABLE INPUT: 450V dc or peak ac 10 seconds per minute. 350V rms continuous.

OPEN-CIRCUIT VOLTAGE: +5V.

DIODE TEST: Display reads junction voltage up to 2.2V. Test Current: 1.6mA nominal.

SETTLING TIME: 2 seconds to within 3 counts of final reading on range.

GENERAL

DISPLAY: $\pm 220,000$ count LCD, 0.45 in. height; polarity, function, range, and status indication.

RANGING: Auto or manual on dc volts, ac volts, and ohms; manual on ac amps and dc amps.

RELATIVE: Pushbutton allows zeroing of on range readings. Allows readings to be made with respect to baseline value. Front panel annunciator indicates REL mode.

DATA LOGGER and MIN/MAX: 100 reading storage capacity; records data at one of six selectable rates from 3 readings/second to 1 reading/hour or by manual triggering. Also detects and stores maximum and minimum readings continuously while in data logger mode.

CONVERSION RATE: 3 readings/second.

OVERRANGE INDICATION: "OL" displayed.

CREST FACTOR (ratio of peak value to rms value), AC FUNCTIONS: 3.

MAXIMUM COMMON MODE VOLTAGE: 500V peak.

COMMON MODE REJECTION RATIO (1k Ω unbalance): Greater than 120dB at dc, 50Hz, 60Hz $\pm 0.1\%$. Greater than 60dB in ac volts.

TEMPERATURE COEFFICIENT (0°-18°C & 28°-50°C): $\pm(0.1 \times \text{applicable one year accuracy specification})/^\circ\text{C}$.

ENVIRONMENT: Operating: 0°-50°C; less than 80% relative humidity up to 35°C; linearly derate 3% RH/°C, 35°-50°C. Storage: -25° to 60°C.

WARMUP: 1 hour to rated accuracy.

POWER: 105-125V or 210-250V (external switch selected). 90-110V available; 50-60Hz, 12V•A. Optional 5-hour battery pack, Model 1978.

DIMENSIONS, WEIGHT: 89mm high \times 235mm wide \times 275mm deep (3 $\frac{1}{2}$ in. \times 9 $\frac{1}{4}$ in. \times 10 $\frac{3}{4}$ in.). Net weight 1.8kg (3 lbs., 14 oz.).

ACCESSORIES SUPPLIED: Model 1751 safety test leads, instruction manual.

ACCESSORIES AVAILABLE:

Model 1010: Single Rack Mounting Kit
Model 1017: Dual Rack Mounting Kit
Model 1301: Temperature Probe
Model 1600A: High Voltage Probe
Model 1641: Kelvin Test Lead Set
Model 1651: 50-Ampere Current Shunt
Model 1681: Clip-On Test Lead Set
Model 1682A: RF Probe
Model 1684: Hard Shell Carrying Case
Model 1685: Clamp-On Ac Probe
Model 1751: Safety Test Leads
Model 1754: Universal Test Lead Kit
Model 1972: IEEE-488 with Analog Output
Model 1973: IEEE-488 Interface
Model 1978: Rechargeable Battery Pack
Model 7008-3: IEEE-488 Digital Cable (3 ft.)
Model 7008-6: IEEE-488 Digital Cable (6 ft.)
Model 8573: IEEE-488 Interface for IBM PC (use with 1972/3)