

# SPECIFICATIONS

## DC VOLTS

(5½ Digits)

RANGE	RESOLUTION	INPUT RESISTANCE	ACCURACY†‡		TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°C
			±(%rdg + counts) 24Hr., 23° ± 1°C	1 Yr., 18°-28°C	
20mV	100 nV	> 1GΩ	0.01 + 40	0.025 + 40	0.003 + 2
200mV	1 μV	> 1GΩ	0.01 + 6	0.025 + 6	0.003 + 0.5
2 V	10 μV	> 1GΩ	0.01 + 8	0.020 + 8	0.003 + 0.5
20 V	100 μV	10MΩ	0.01 + 6	0.030 + 6	0.003 + 0.5
200 V	1mV	10MΩ	0.01 + 8	0.025 + 8	0.003 + 0.5
1000 V	10mV	10MΩ	0.01 + 6	0.025 + 6	0.003 + 0.5

†After pushbutton or bus zeroing.

‡In 4½ digit mode, counts = ±2 (except ±4 on 20mV range after zeroing).

NMRR: Greater than 60dB at 50 or 60Hz.

CMRR: Greater than 120dB at DC and 50 or 60Hz (with 1kΩ in either lead).

MAXIMUM ALLOWABLE INPUT: 1000V peak.

BENCH READING RATE: 5 readings/second.

## OHMS

(5½ Digits)

RANGE	RESOLUTION	I short	Vopen	ACCURACY†‡		TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°C
				±(%rdg + counts) 24Hr., 23° ± 1°C	1 Yr., 18°-28°C	
20 Ω	100 μΩ	- 2mA	-2V	0.015 + 25	0.025 + 25	0.003 + 2
200 Ω	1mΩ	- 2mA	-2V	0.015 + 7	0.025 + 7	0.003 + 0.5
2 kΩ	10mΩ	- 2mA	-2V	0.015 + 5	0.022 + 5	0.003 + 0.5
20 kΩ	100mΩ	- 20 μA	-2V	0.015 + 7	0.025 + 7	0.003 + 0.5
200 kΩ	1 Ω	- 20 μA	-2V	0.015 + 5	0.022 + 5	0.003 + 0.5
2MΩ	10 Ω	-200 nA	-2V	0.03 + 7	0.050 + 7	0.015 + 1
20MΩ	100 Ω	-200 nA	-2V	0.06 + 5	0.100 + 5	0.025 + 1

†After pushbutton or bus zeroing.

‡In 4½-digit mode, counts = ±2 (except ±4 on 20Ω range after zeroing).

CONFIGURATION: Automatic 2- or 4-terminal.

MAXIMUM ALLOWABLE INPUT: 360V peak or 250V rms.

BENCH READING RATE: 3 readings/second except 20MΩ range, 1 reading/second.

## TEMPERATURE

(5½ Digits)

SPAN	RESOLUTION	4-WIRE ACCURACY <sup>1</sup>		TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°C
		±(%rdg + counts) 1 YR., 18°-28°C	±(%rdg + counts) 1 YR., 18°-28°C	
°C				
-200.00° to 230.00°	0.01°	0.03 + 10	0.03 + 10	0.003 + 0.4
230.00° to 630.00°	0.01°	0.03 + 40	0.03 + 40	0.003 + 4
-220.00° to -200.00°	0.01°	0.03 + 40	0.03 + 40	0.003 + 4
°F				
-328.00° to 446.00°	0.01°	0.03 + 18	0.03 + 18	0.003 + 0.7
446.00° to 1100.00°	0.01°	0.03 + 72	0.03 + 72	0.003 + 7
-360.00° to -328.00°	0.01°	0.03 + 72	0.03 + 72	0.003 + 7

<sup>1</sup> Autorange mode, excluding probe errors.

RTD TYPE: 100Ω platinum; DIN 43 760 or IPTS-68, Programmable alpha and delta 3- or 4-wire.

MAXIMUM LEAD RESISTANCE (each lead): 4-wire: 25Ω.  
3-wire: 15Ω.

SENSOR CURRENT: 1.0mA maximum, RMS.

BENCH READING RATE: 1.2 reading per second.

MAXIMUM COMMON MODE VOLTAGE: 500V (42V with Model 1951 connected).

COMMON MODE REJECTION: Less than 0.005°C/volt at DC, 50Hz and 60Hz (100Ω unbalance, LO driven).

MAXIMUM ALLOWABLE INPUT: 360V peak, 250V rms.

## TRMS AC VOLTS (Option 1950)

(5½ Digits)

RANGE	RESOLUTION	20Hz-45Hz	ACCURACY (1 Year)†		
			±(%rdg + counts) 18°-28°C	10kHz-20kHz	20kHz-50kHz
200mV*	1 μV	0.8 + 200	0.3 + 200	0.7 + 200	2.0 + 300
2 V	10 μV	0.8 + 200	0.3 + 200	0.7 + 200	2.0 + 250
20 V	100 μV	0.8 + 200	0.3 + 200	0.7 + 200	1.5 + 250
200 V	1mV	0.8 + 200	0.3 + 200	0.7 + 200	1.5 + 250
700 V	10mV	0.8 + 200	0.3 + 200	0.7 + 200	1.5 + 250

†In 4½ digit mode, divide count error by 10.

\*Above 1mV.

TEMPERATURE COEFFICIENT (0°-18°C & 28°-50°C): Less than ±(0.1 × applicable accuracy specification)/°C.

RESPONSE: True root mean square, AC coupled.

CREST FACTOR (ratio of peak to rms): Up to 3:1 allowable.

INPUT IMPEDANCE: 2MΩ shunted by less than 75pF.

MAXIMUM ALLOWABLE INPUT: 1000V peak, 10<sup>7</sup>V•Hz.

BENCH READING RATE: 3 readings/second.

CMRR: Greater than 60dB at DC, 50 or 60Hz (with 1kΩ in either lead).

BANDWIDTH: -3dB at 250kHz typical.

## DC AMPS (Option 1950)

(5½ Digits)

RANGE	RESOLUTION	ACCURACY (1 YEAR)†‡	TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°C	MAXIMUM VOLTAGE BURDEN
20 μA	100pA	0.14 + 40‡	0.01 + 2	0.03V
200 μA	1nA	0.09 + 10	0.01 + 0.5	0.25V
2mA	10nA	0.09 + 10	0.01 + 0.5	0.25V
20mA	100nA	0.09 + 10	0.01 + 0.5	0.25V
200mA	1μA	0.09 + 10	0.01 + 0.5	0.28V
2 A	10μA	0.09 + 10	0.01 + 0.5	1 V

†In 4½ digit mode, counts = ±2 (except ±4 on 20μA range after zeroing).

‡After pushbutton or bus zeroing.

OVERLOAD PROTECTION: 2A fuse (250V), externally accessible.

BENCH READING RATE: 5 readings/second.

## TRMS AC AMPS (Option 1950)

(5½ Digits)

RANGE	RESOLUTION	ACCURACY (1 YEAR)†‡	TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°C	MAXIMUM VOLTAGE BURDEN
200 μA	1nA	0.6 + 250	0.04 + 10	0.25V
2mA	10nA	0.6 + 250	0.04 + 10	0.25V
20mA	100nA	0.6 + 250	0.04 + 10	0.25V
200mA	1 μA	0.6 + 250	0.04 + 10	0.28V
2 A	10 μA	0.6 + 250	0.04 + 10	1 V

†In 4½ digit mode, divide count error by 10.

‡Above 0.5% of range.

RESPONSE: True root mean square, AC coupled.

CREST FACTOR (ratio of peak to rms): Up to 3:1 allowable.

OVERLOAD PROTECTION: 2A fuse (250V), externally accessible.

BENCH READING RATE: 3 readings/second.

## IEEE-488 BUS IMPLEMENTATION

**Multiline Commands:** DCL, LLO, SDC, GET, GTL, UNT, UNL, SPE, SPD.

**Uniline Commands:** IFC, REN, EOI, SRQ, ATN.

**Interface Functions:** SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0, E1.

**Programmable Parameters:** Range, Function, Zero, Integration Period, Averaging, EOI, Trigger, Terminator, Delay\*, 100-rdg. Storage, Calibration, Display, Multiplex Off, Status, Service Request, Self Test, Output Format.

\*First reading is correct when step input is coincident with trigger.

### Conversion Rates (DC Volts):

USEABLE RESOLUTION	INTEGRATION PERIOD	TRIGGER TO FIRST BYTE OUT	MAXIMUM READING RATE†
3 ½ Digit	3.3 ms	17ms	76
4 ½ Digit	16.66ms‡	30ms	36
5 ½ Digit	100 ms	114ms	9

†Readings/second.

‡20ms at 50Hz.

**Address Modes:** TALK ONLY and ADDRESSABLE.

## FRONT PANEL PROGRAMS

- 0 **Clear**—Cancels program mode.
- 1 **Non-Volatile RAM Storage**—Store programs 3, 4, 5, 6 and 8 data in NVRAM
- 2 **Multiplex**—Defeats input amplifier multiplexing.
- 3 **IEEE bus mode**—ADDRESSABLE and TALK ONLY entry.
- 4 **Line Frequency**—Selects 50Hz or 60Hz operation.
- 5 **Calibration**—Performs digital calibration.
- 6 **Temperature**—Allows °C and °F temperature measurements.
- 7 **Data Logger**—Allows 100-reading storage at 9 programmable rates; also stores highest, lowest and average reading.
- 8 **Diagnostics**—Troubleshooting aid and self-test.
- 9 **Trigger**—Enables front panel or external triggering.

## GENERAL

**DISPLAY:** Six 0.5" LED digits with decimal point, exponent and polarity. Function and IEEE bus status also displayed.

**RANGING:** Manual or fast autoranging (150ms per range change on DCV).

**ISOLATION:** Input LO to IEEE LO or power line ground: 500V max,  $5 \times 10^5$  V•Hz; greater than  $10^9\Omega$  paralleled by 300pF.

**WARMUP:** 1 hour to rated accuracy.

**OPERATING ENVIRONMENT:** 0°-50°C, 0% to 80% relative humidity up to 35°C.

**STORAGE ENVIRONMENT:** -25° to 65°C.

**POWER:** 105-125V or 210-250V (internal switch selected), 50Hz to 400Hz, 24V•A maximum. 90-110V and 180-220V version available upon request.

**CONNECTORS:** **Analog:** Switch selectable front or rear, 5-way gold plated binding posts. **Digital:** Trigger input and Voltmeter Complete output on rear panel, BNCs.

**DIMENSIONS, WEIGHT:** 127mm high × 216mm wide × 359mm deep (5" × 8½" × 14 1/8 "). Net weight 3.2kg (7 lbs.).