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PURCHASED ITEM

PART NUMBER SPEC 195A

MODEL 195A

SPECIFICATIONS

DC VOLTS

(5½ Digits)

RANGE	RESOLUTION	INPUT RESISTANCE	ACCURACY†‡ ±(%rdg + counts) 24Hr., 23° ±1°C	ACCURACY†‡ ±(%rdg + counts) 1 Yr., 18°-28°C	TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°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	OUTPUT I short	OUTPUT Vopen	ACCURACY†‡ ±(%rdg + counts) 24Hr., 23° ±1°C	ACCURACY†‡ ±(%rdg + counts) 1 Yr., 18°-28°C	TEMPERATURE COEFFICIENT ±(%rdg + counts)/°C 0°-18°C & 28°-50°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: 350V peak or 250V rms.
BENCH READNG RATE: 3 readings/second except 20MΩ range, 1 reading/second.

TEMPERATURE

(5½ Digits)

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

[1] 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: 350V peak, 250V rms.

TRMS AC VOLTS (Option 1950)

(5½ Digits)

RANGE	RESOLUTION	ACCURACY (1 Year)† ±(%rdg + counts) 18°-28°C 20Hz-45Hz	45Hz-10kHz	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, 10^7V•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)†‡ ±(%rdg + counts) 18°-28°C	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	0.25V
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)†* 45Hz-10kHz ±(%rdg + counts) 18°-28°C	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	0.25V
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.

LTR	REVISIONS	APP.	DATE
A	9721 RELEASED	[illegible]	2-24-84

DRN [illegible] DATE 2/23/84
CKD. DATE
APP. DATE

KEITHLEY Keithley Instruments Inc. Cleveland, Ohio 44139

SPECIFICATIONS

PART NUMBER SPEC 195A

FORM 28777A

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PART NUMBER SPEC 195A

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†
3½ Digit	3.3 ms	17ms	76
4½ Digit	16.66ms‡	30ms	36
5½ 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, 5×10^8 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.).

SPEC ADDENDA

The following is supplied as clarification of the 195A/1950 specifications.

195A

1. The NMRR specification is at 50 or 60Hz, ± .1%. For line frequencies out of this tolerance the filter mode can be used to improve measurement ability.
2. The front panel zero requirement necessary to meet rated accuracy, should be performed within an hour of making measurements. This applies to a warmed up instrument under stable temperature conditions.
3. Program 2 defeats the auto cal and auto zeroing of the A-D converter and input amplifier. In this mode, measurements should be made in a stable environment to maintain rated accuracy. It is recommended to periodically exit Program 2 to allow the instrument to re-autocal and zero itself.

1950

1. Crest Factor: Specified for pulse widths ≥ 100μsec, peak voltage ≤1.5 times full scale.

ACCESSORIES AVAILABLE

Model 1019A: Universal Fixed Rack Mounting Kit
Model 1019S: Universal Slide Rack Mounting Kit
Model 1000A: High Voltage Probe
Model 1641: Kelvin Test Lead Set
Model 1651: 50-Ampere Shunt
Model 1681: Clip-On Test Lead Set
Model 1682A: RF Probe
Model 1683: Universal Test Lead Set
Model 1685: Clamp-On Current Probe
Model 1950: TRMS ACV, ACA, DCA Option
Model 1951: Input Adapter for Temperature Probes (4-wire)
Model 7008-3: IEEE-488 Cable, 3 ft. (0.9m)
Model 7008-6: IEEE-488 Cable, 6 ft. (1.8m)
Model 8681: Connector Kit (enables connecting to 3- or 4-wire RTDs)
Model 8693: General Purpose/Immersion Probe (4-wire)
Model 8695: Surface Probe (4-wire)
Model 8696: Air/Gas Probe (4-wire)

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