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Test & Measurement

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Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

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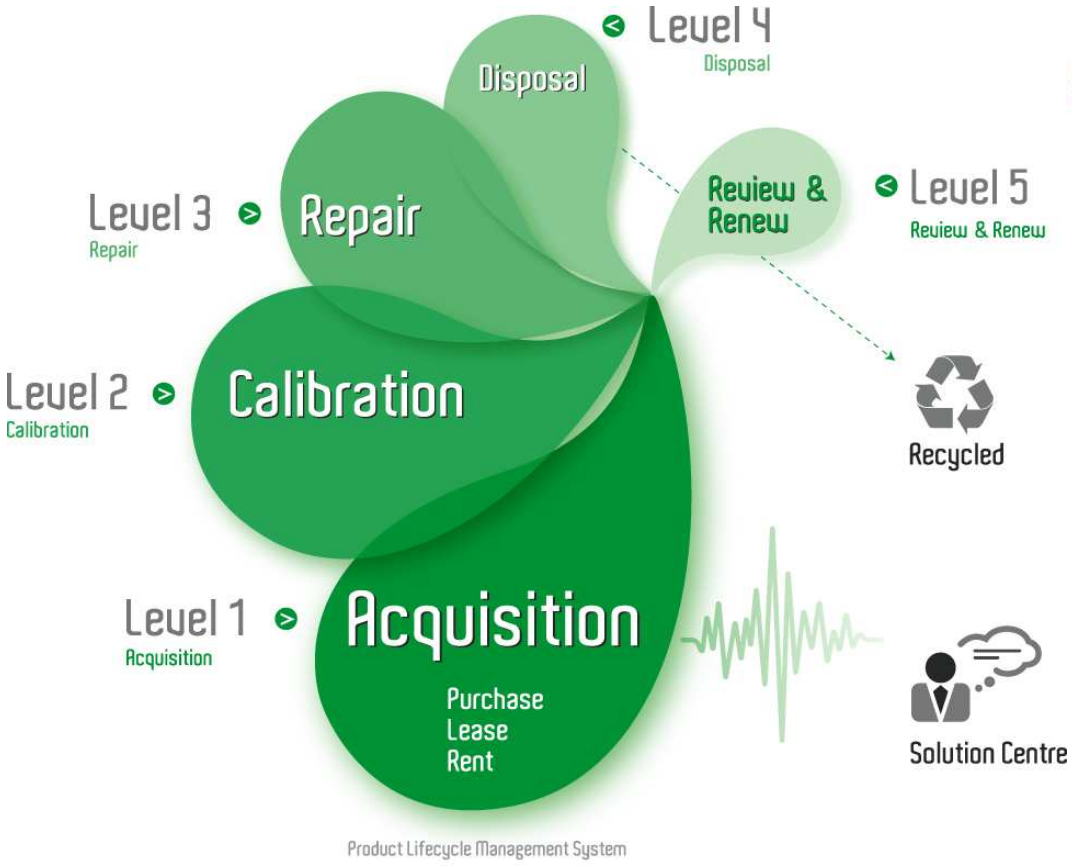
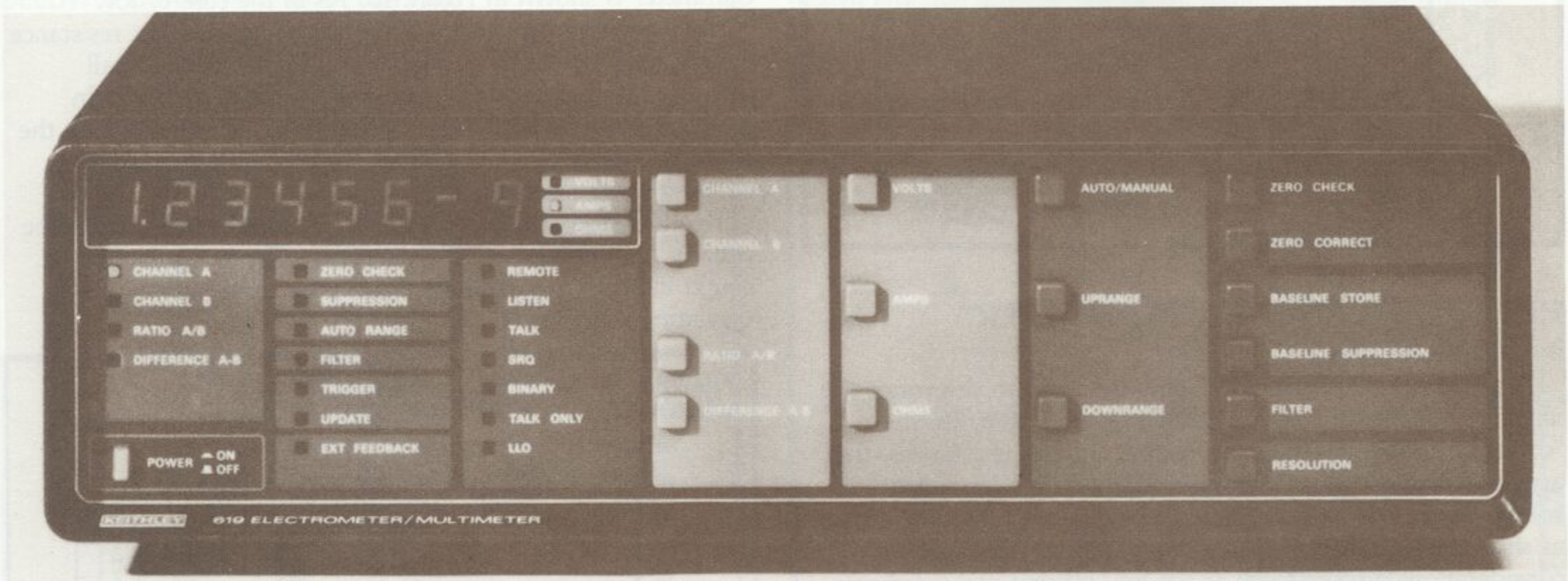


619/Electrometer/Multimeter

Bench/Systems

- Dual Channel & IEEE-488 options
- Full systems capability
- Electrometer sensitivity
- Multimeter convenience & format



The Model 619 Electrometer/Multimeter is designed—and optimized—to perform the tasks of measuring V, I and Ω in an automatic system. It performs all sub-tasks related to its mission without imposing constraints on the controller. As a result the 619 can easily be incorporated into system configurations, is easy to use, and accomplishes all this at a sensible price.

The 619 is more than flexible. It is genuinely expandable. Configured as a single-channel, precision bench electrometer/multimeter, it offers you sensitivity and convenience unmatched by comparably priced instruments. Add the optional second channel and the 619 doubles its measurement capability. Add the interface card and the 619 becomes a sophisticated, fully programmable systems multimeter capable of meeting the demanding and varied requirements of system configurations found in research and the semiconductor industry.

The μP-based 619 performs the functions for which it is best suited, which frees your controller for systems level functions and reduces software generation time. For example, zero correction can be done automatically within the instrument. And because of unique μP operation, you need to do it only once for errors on all ranges within the function. With the 619 you never need to interrupt an automatic sequence with manual zero correction. The 619 frees your system to perform most effectively.

Data Storage. The Data Store capability allows you to obtain up to 50 readings at selected rates for examination at the convenience of the system. The 619 allows you to define your baseline and read either absolute values or deviations from the baseline automatically.

Dual Channel. Channel A and optional Channel B have independent analog signal grounds and independent function and range programming.

Ratio, Difference. Computes the ratio (A/B) or difference (A-B) of the readings from each channel. A reading is taken on Channel A, then on Channel B and the microprocessor calculates and displays the results.

Volts, Amps, Ohms. Each channel can be independently programmed. In addition to volts ranges from 200mV to 200V, amps ranges from 2nA to 2A, and ohms ranges from 2kΩ to 2TΩ, an "external feedback" range may be selected, which permits measurement of charge, logarithmic currents, or provides nonlinear response characteristics, depending on the type of element externally connected from analog output to input.

Auto/Manual, Up, Down. Ranging can be either automatic or manual. Any range, including autorange, may be selected from the bus or the front panel.

Zero Check/Zero Correct. Zero Check places the signal amplifier in a "standby" position. Internal voltage offsets may be compensated in this mode by the Zero Correct button.

Baseline Store, Baseline Suppress. Touching Baseline Store will save the displayed reading in the memory. The Baseline Suppress button will then correct all future readings (on any range within that function) by subtracting the stored value.

Filter. Selection activates a low-pass filter for additional line frequency or noise rejection on the selected channel.

Resolution. At the touch of a button (or a single command), the 619 may be converted to a 5½-digit instrument. The additional digit is in the least significant place providing an additional decade of digital sensitivity.

Interfaceability. Modular instructions make the 6193 interface option easy to program. There are 8 trigger modes, maskable SRQ, programmable ASCII terminators, variable length Data Storage, Binary or ASCII data formats, and ten different speed/resolution combinations to 18ms/3½ digits.

VOLTS

RANGE	MAXIMUM READING	ACCURACY 1 YR., 23° ±5°C ±(%rdg + digits)	TEMPERATURE COEFFICIENT 0-18°C & 28-50°C ±(%rdg + digits)/°C
200mV	199.99×10^{-3}	0.01 % +4d	0.002% +3 d
2 V	1.9999	0.01 % +1d	0.002% +0.3 d
20 V	19.999	0.015% +1d	0.002% +0.03d
200 V	199.99	0.015% +1d	0.002% +0.03d

INPUT CAPACITANCE: Less than or equal to 20pF.
INPUT RESISTANCE: Greater than or equal to 20TΩ.
NMRR: Greater than 55dB (greater than 80dB with FILTER).
CMRR: Greater than 100dB (greater than 125dB with FILTER).
ANALOG SETTLING TIME (to 0.1% of final value, unfiltered): Less than 5ms.

AMPS

RANGE	MAXIMUM READING	ACCURACY 1 YR., 23°±5°C ±(%rdg + digits)	TEMPERATURE COEFFICIENT 0-18°C & 28-50°C ±(%rdg + digits)/°C	INVERTING FULL SCALE ANALOG OUTPUT
2 nA	1.9999×10^{-9}	0.35% +6d	0.02% +3 d	0.2V
20 nA	19.999×10^{-9}	0.35% +4d	0.02% +0.3d	2.0V
200 nA	199.99×10^{-9}	0.15% +4d	0.01% +3 d	0.2V
2 μA	1.9999×10^{-6}	0.15% +1d	0.01% +0.3d	2.0V
20 μA	19.999×10^{-6}	0.15% +4d	0.01% +3 d	0.2V
200 μA	199.99×10^{-6}	0.15% +6d	0.01% +0.3d	2.0V
2mA	1.9999×10^{-3}	0.15% +4d	0.01% +3 d	0.2V
20mA	19.999×10^{-3}	0.15% +1d	0.01% +0.3d	2.0V
2 A	1.9999	0.15% +4d	0.01% +2 d	None

INPUT VOLTAGE DROP: Less than 1mV at full-scale except less than 0.6V on 2A range.
ANALOG SETTLING TIME (to 0.1% of final value, unfiltered): 2nA through 2μA: 50ms; 20μA through 2A: 5ms.
NMRR: 2nA through 2μA: 70dB; 20μA through 2A: 55dB.

OHMS

RANGE	MAXIMUM READING	ACCURACY 1 YR., 23°±5°C ±(%rdg + digits)	TEMPERATURE COEFFICIENT 0-18°C & 28-50°C ±(%rdg + digits)/°C	MAXIMUM OPEN-CIRCUIT VOLTAGE
2 kΩ	1.9999×10^{3}	0.2 % +4d	0.01% +3 d	5V
20 kΩ	19.999×10^{3}	0.2 % +1d	0.01% +0.3 d	5V
200 kΩ	199.99×10^{3}	0.15% +4d	0.01% +3 d	5V
2MΩ	1.9999×10^{6}	0.15% +1d	0.01% +0.3 d	5V
20MΩ	19.999×10^{6}	0.35% +4d	0.02% +3 d	5V
200MΩ	199.99×10^{6}	0.35% +1d	0.02% +0.3 d	5V
2 GΩ	1.9999×10^{9}	0.35% +1d	0.02% +0.03d	300V
20 GΩ	19.999×10^{9}	1 % +1d	0.15% +0.3 d	300V
200 GΩ	199.99×10^{9}	4 % +1d	0.5 % +0.03d	300V
2 TΩ	1.9999×10^{12}	10 % +1d	0.5 % +0.03d	300V

OHMS CURRENT SOURCES: 2kΩ, 20kΩ: 100μA.
200kΩ, 2MΩ: 1μA.
20MΩ, 2GΩ: 10nA.
20GΩ through 2TΩ: 100pA.

ANALOG OUTPUT: Analog output voltage level is the product of the Ohms current source and the resistance being measured.

ANALOG SETTLING TIMES:

To 0.1% of final value, unfiltered, with less than 100pF input capacitance:	2kΩ through 2MΩ: 5ms. 20MΩ: 20ms. 200MΩ: 200ms.
To 10% of final value, unfiltered, using 6191 Guarded Input Adapter with less than 1pF unguarded input capacitance:	2GΩ: 150ms. 20GΩ: 1.5s. 200GΩ: 15s. 2TΩ: 150s.

GENERAL

DISPLAY: Numeric; 0.56" LED digits, 4½-digit mantissa @ 6.2rdg/s (5½-digits @ 2.4 rdg/s in high resolution mode), 2 digit exponent, decimal point, signed exponent and mantissa.
OVERRANGE INDICATION: Display reads OFLO.
MAXIMUM ALLOWABLE INPUT: 250V rms DC to 60Hz sinewave.
INPUT CURRENT (18-28°C): Less than 0.4pA.
INPUT CONNECTORS (6194 Electrometer rear panel): 2 Ampere range: 5-way binding posts. All other ranges and functions via Teflon® insulated triaxial connector.
OUTPUT CONNECTORS: Analog: Amphenol Series 80 (Microphone), 6194 Electrometer rear panel. **IEEE:** Amphenol or Cinch Series 57, 6193 IEEE Interface rear panel.
MAXIMUM ALLOWABLE COMMON MODE VOLTAGES:
Input LO (Channel A) to line ground: 250V rms, DC to 60Hz sinewave.
Input LO (Channel B) to line ground: 250V rms, DC to 60Hz sinewave.
Input LO (Channel A) to Input LO (Channel B): 250V rms, DC to 60Hz sinewave.
WARMUP: 1 hour to rated accuracy.
POWER: 90-110, 105-125, 180-220 or 210-250V, 50 or 60Hz (internal switch selected). 75W max., 100V•A max. (internally fan cooled).
ENVIRONMENTAL LIMITS: Operating: 0-50°C, up to 35°C at 70% non-condensing R.H. **Storage:** −20°C to 70°C.

6193 INTERFACE SPECIFICATIONS

IEEE-488 BUS IMPLEMENTATION:
Multiline Commands: DCL, LLO, SDC, GET.
Uniline Commands: IFC, REN, EOI, SRQ, ATN. Compatible with IEEE-488-1978 standard.
PROGRAMMABLE PARAMETERS:
Front Panel Controls: Function, Range, Filter, Zero Check, Zero Correct, Baseline Store, Baseline Suppress.
Internal Parameters: SRQ Response, Trigger Modes, Binary or ASCII Data Formats, number of readings to be stored, data terminators, reading rates, integration period.
ADDRESS MODES: Talk Only and Addressable.
RESPONSE TIME (from TRIGGER to first byte available): S0: 18ms at 4ms integration time (binary data); S1: 35ms at 16.67ms integration time (ASCII data), 38ms at 20ms integration time (ASCII data); S4: 200ms at 100ms integration time (ASCII data).
DIMENSIONS, WEIGHT: 432mm wide × 127mm high × 406mm deep (17" × 5" × 16"), stackable enclosure. Net weight, 9.8kg (22 lbs.) with Channel B Electrometer module and IEEE-488 Interface module.
ACCESSORIES SUPPLIED: One Model 6194 Electrometer Module and one Model 6011 Input Cable.
ACCESSORIES AVAILABLE:
6191 Guarded Input Adapter
6193 IEEE Interface
6194 Electrometer Module (includes 6011 Input Cable)
6199 5¼" Rack Mount Kit with Chassis Slides
7088 IEEE-488 Digital Cable