

486 and 487 Picoammeters

AMMETER

RANGE	RESOLUTION	ACCURACY (1 Year)* 18°–28°C ±(%rdg + offset)	ANALOG OUTPUT Rise Time (10%–90%) Analog Filter	
			OFF	ON
2 nA	10 fA	0.3 + 500 fA	12 ms	70 ms
20 nA	100 fA	0.2 + 3 pA	4 ms	17 ms
200 nA	1 pA	0.15 + 20 pA	800 μs	4 ms
2 μA	10 pA	0.15 + 200 pA	380 μs	2 ms
20 μA	100 pA	0.1 + 2 nA	160 μs	370 μs
200 μA	1 nA	0.1 + 20 nA	160 μs	370 μs
2 mA	10 nA	0.1 + 200 nA	160 μs	370 μs

* When properly zeroed.

MAXIMUM OVERLOAD: 350V peak on nA ranges and 2μA range; 50V peak on 20μA, 200μA, and 2mA ranges. Higher voltage sources must be current limited at 3mA.

INPUT VOLTAGE BURDEN: <200μV (18°–28°C) for inputs <100μA; <2mV for 2mA input; 20μV/°C temperature coefficient.

TEMPERATURE COEFFICIENT (0°–18°C & 28°–50°C): ±(0.15 × applicable accuracy specification) / °C.

NMRR: >60dB at 50Hz (LINE 50Hz integration) or 60Hz (LINE 60Hz integration).

ANALOG OUTPUT:

Range: ±2V for full range input (non-inverting).

Accuracy: ±(2.5% + 3mV); resistive loads >2kΩ; 18°–28°C.

Impedance: <100Ω, DC–2kHz.

RANGING: Automatic or manual.

AUTORANGING TIME: <200ms to final range (analog filter OFF).

MAXIMUM READING RATES (readings/second):

INTEGRATION SETTING	RESOLUTION	CONTINUOUS INTO DATA STORE	EXTERNAL TRIGGERED INTO DATA STORE	TRIGGERED VIA IEEE-488 BUS**
FAST	4½-Digit	100	180	16
LINE 60Hz	5½-Digit	40	44	14
LINE 50Hz	5½-Digit	33	38	12

** One-shot on TALK, G7 data format.

VOLTAGE SOURCE (487 only):

RANGE (maximum value)	STEP SIZE (typical)	ACCURACY (1 Year) 18°–28°C ±(%setting + offset)	NOISE (p-p)*** 0.1–10Hz	TEMPERATURE COEFFICIENT 0°–18°C & 28°–50°C
±505.00 V	10 mV	0.15 + 40 mV	<1.5 mV	80 ppm + 2 mV/°C
±50.500 V	1 mV	0.1 + 4 mV	<150 μV	50 ppm + 200μV/°C

*** With LO terminal connected to chassis.

SELECTABLE CURRENT LIMIT: 2.5mA ±0.5mA or 25μA ±5μA.

WIDEBAND NOISE: <60/400mV p-p ±50/±500V range, 0.1Hz to 20MHz.

TIME STABILITY: ±(0.003% + 1mV) over 24 hours at constant temperature.

OUTPUT RESISTANCE: <2.5Ω.

V/I OHMS (487 only)

Used with voltage source; resistance calculated from voltage setting and measured current. V/I OHMS accuracy equals voltage source accuracy plus ammeter accuracy. Typical accuracy better than 0.6% for readings between 1kΩ and 1TΩ.

IEEE-488 BUS IMPLEMENTATION

MULTILINE COMMANDS: DCL, 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: All parameters programmable except for IEEE-488 bus address and frequency for line integration.

TRIGGER TO FIRST BYTE: <50ms (trigger on TALK, ATN false to talker DAV true, G7 data format).

GENERAL

DATA STORE and MIN/MAX: Stores up to 512 readings and identifies minimum and maximum reading.

PROGRAMMABLE READING INTERVAL: 10ms to 999.999s in 1ms increments.

TRIGGER: One-shot or continuous from front panel, IEEE-488 bus, and rear panel BNC.

PROGRAMMABLE TRIGGER DELAY: 1ms to 999.999s in 1ms increments.

DISPLAY: One ten character plus one eight character alphanumeric LED displays with normal/dim/off intensity control.

MAXIMUM VOLTAGE BETWEEN VOLTAGE SOURCE AND CURRENT METER: 500V DC.

MAXIMUM VOLTAGE BETWEEN CHASSIS AND VOLTAGE SOURCE OR CURRENT METER: 500V DC.

REAR PANEL CONNECTORS:

Input Connector: 3-lug triax.

Analog Output: 5-way binding post.

External Trigger and Meter Complete: BNC connectors.

IEEE-488 Connector: Chassis grounded.

Voltage Source Output (487 only): 5-way binding post.

Interlock Connector (487 only): 3-pin miniature DIN.

EMC: Conforms to European Union Directive 89/336/EEC.

SAFETY: Conforms to European Union Directive 73/23/EEC (meets EN61010-1/IEC 1010).

ENVIRONMENT:

Operating: 0°–50°C, <70% RH up to 35°C; linearly derate 3% RH/°C, up to 50°C.

Storage: –25° to 60°C.

WARM-UP: 2 hours to rated accuracy.

POWER: 105–125V AC or 210–250V AC (external switch selectable), 90–110V and 180–220V AC version available. 50Hz or 60Hz, 45VA maximum.

DIMENSIONS, WEIGHT: 90mm high × 213mm wide × 397mm deep (3½ in × 8½ in × 15½ in). Net weight 4.25kg (9.3 lb).

ACCESSORIES SUPPLIED:

Instruction Manual

Quick Reference Guide

Model 236-ILC-3 (487 only): Interlock Cable

Model 7078-ALG: 3-slot Triax to Alligator Clip Cable