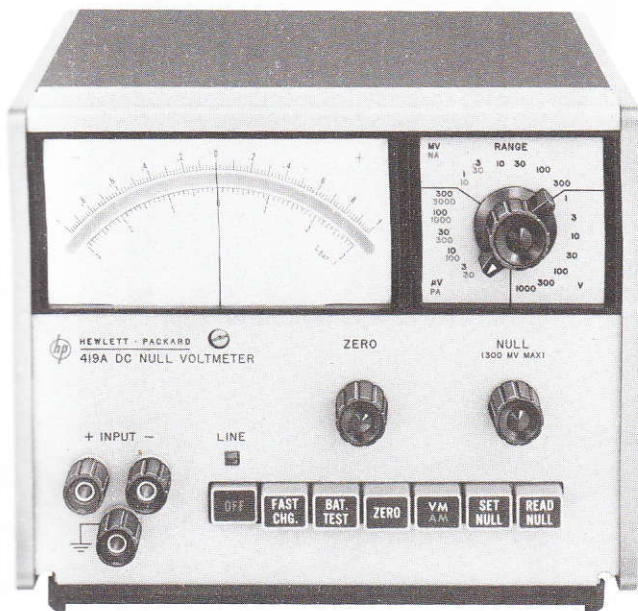




Description

Eighteen voltage ranges with $0.1 \mu\text{V}$ resolution on the lowest range. Accuracy of this rechargeable battery-operated instrument is $\pm 2\%$ of end scale $\pm 0.1 \mu\text{V}$ on all ranges. Noise is less than $0.3 \mu\text{V}$ p-p, and drift is less than $0.5 \mu\text{V}/\text{day}$.

An internal nulling voltage allows input voltages up to 300 mV to be nulled giving an infinite input impedance. Input impedance above 300 mV range is 100 megohms .

Seven pushbuttons allow rapid function selection. This dc null voltmeter operates from ac line or from internal rechargeable batteries. During operation from ac line, batteries are trickle-charged. A fast-charge pushbutton is provided to increase the charging rate, recharging batteries in approximately 16 hours. Battery voltage may be checked with the battery-test pushbutton. The zero pushbutton allows compensation for any internal offsets before measurement. When this pushbutton is depressed, the positive leg of the voltmeter is disconnected from the positive input terminal.

When the voltmeter pushbutton is depressed, HP 419A functions as a zero-center scale $3 \mu\text{V}$ to 1000 V dc voltmeter.

When the AM pushbutton is depressed, HP 419A functions as a zero-center scale 30 pA to 30 nA ammeter.

Specifications

DC null voltmeter

Ranges: $\pm 3 \mu\text{V}$ to $\pm 1000 \text{ V}$ dc in 18 zero-center ranges.

Accuracy: $\pm (2\% \text{ of range} \pm 0.1 \mu\text{V})$.

Zero control range: $> \pm 15 \mu\text{V}$.

Zero drift: $< 0.5 \mu\text{V}/\text{day}$ after 30 min warm-up.

Zero temperature coefficient: $< 0.05 \mu\text{V}/^\circ\text{C}$.

Response time: 3 s to within 95% of final reading on $3 \mu\text{V}$ range; 1 s to within 95% of final reading on $10 \mu\text{V}$ to 1000 V ranges.

Noise: $< 0.3 \mu\text{V}$ p-p, input shorted. Noise amplitude approximates Gaussian distribution. RMS value (standard deviation) is $< 0.075 \mu\text{V}$, p-p noise value is $< 0.3 \mu\text{V}$ 95% of the time.

Input characteristics

At null: infinite resistance on $3 \mu\text{V}$ through 300 mV ranges in set null mode. Negative input terminal can be floated to $\pm 500 \text{ V}$ dc from power line ground.

Off null

Voltage range	Input resistance
$3 \mu\text{V} - 3 \text{ mV}$	$100 \text{ k}\Omega$
$10 \text{ mV} - 30 \text{ mV}$	$1 \text{ M}\Omega$
$100 \text{ mV} - 300 \text{ mV}$	$10 \text{ M}\Omega$
$1 \text{ V} - 1000 \text{ V}$	$100 \text{ M}\Omega$

Negative input terminal can be floated up to $\pm 500 \text{ V}$ dc from power-line ground.

AC normal mode rejection: ac voltages 50 Hz and above and 80 dB greater than end scale affect reading $< 2\%$. Peak ac voltage not to exceed maximum overload voltage.

DC ammeter

Ranges: $\pm 30 \text{ pA}$ to $\pm 30 \text{ nA}$ in 7 zero-center ranges.

Accuracy: $\pm (3\% \text{ of range} + 1 \text{ pA})$.

Zero control range: $> \pm 150 \text{ pA}$.

Zero drift: $< 5 \text{ pA}/\text{day}$ after 30 min warm-up.

Zero temperature coefficient: $< 0.5 \text{ pA}/^\circ\text{C}$.

Noise: $< 3 \text{ pA}$ p-p, input shorted.

Input resistance: $100 \text{ k}\Omega$ on all ranges.

Amplifier

Gain: 110 dB on $3 \mu\text{V}$ range, decreases 10 dB per range.

Output: 0 to $\pm 1 \text{ V}$ at 1 mA maximum for end-scale reading. Output level adjustable for convenience when used with recorders.

Output resistance: depends on setting of output level control. $< 35 \Omega$ when output control is set to maximum.

Noise: 0.01 Hz to 5 Hz : same as voltmeter (referred to input). $> 5 \text{ Hz}$: $< 10 \text{ mV rms}$ (referred to output).

General

Overload protection: the following voltages can be applied without damage to instrument.

1 V to 1000 V range: 1200 V dc.

10 mV to 300 mV range: 500 V dc.

3 μV to 300 mV range: 50 V dc.

Operating temperature: instrument will operate within specifications from 0°C to 50°C .

Operating humidity: $< 70\% \text{ R.H.}$

Storage temperature: -20°C to $+50^\circ\text{C}$.

Power: 115 V or $230 \text{ V} \pm 10\%$, 48 Hz to 440 Hz , 2 VA max. or 4 internal rechargeable batteries (furnished). 30-hr operation per recharge. Operation from ac line permissible during recharge.

Size: 156 H (without removable feet), 197 W , 203 mm D ($6\frac{3}{4}'' \times 7\frac{3}{4}'' \times 8''$).

Weight: net, 3.7 kg (8.3 lb). Shipping, 5.4 kg (12 lb).

419A DC Null Volt-Ammeter