

# COMPONENT & SEMICONDUCTOR MEASUREMENT

Milliohmmeter/High Resistance Meter

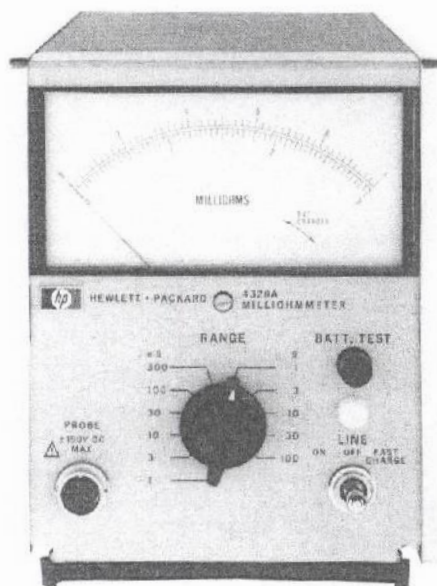
Model 4328A/4329A

225



- 20  $\mu\Omega$  resolution on 1 m $\Omega$  range
- Four terminal measurement
- Low test voltage

- Wide range: 500 k $\Omega$  to  $2 \times 10^{16} \Omega$
- Selectable test voltages: 10 V to 1000 V



HP 4328A

## Description

HP's 4328A Milliohmmeter is a high sensitivity portable instrument for measurement of low resistances. The 1 m $\Omega$  to 100  $\Omega$  measuring range and 20  $\mu\Omega$  resolution make the HP 4328A ideal for measuring the contact resistance of switches, relays, and connectors and the resistivity of conductors and semiconductors. Series reactances of up to twice the full scale resistance will not affect the accuracy. The maximum voltage across a sample, with the instrument at the proper range, is less than 200  $\mu\text{V}$  peak. Even at incorrect range settings, the voltage across the sample will not exceed 20 mV peak.

The special probes that allow four-terminal measurement in two probes are furnished with the HP 4328A.

The basic HP 4328A is line operated but Opt 001 permits operation from rechargeable batteries for 15 continuous hours.

## Specifications

**Range:** 0.001 to 100 ohms full scale in a 1, 3 sequence.

**Accuracy:**  $\pm 2\%$  of full scale. No additional error is caused by series reactance of samples up to two times full scale.

**Measuring frequency:** 1000 Hz  $\pm 100$  Hz.

**Voltage across sample:** 200  $\mu\text{V}$  peak at full scale.

**Maximum voltage across sample:** 20 mV peak.

**Superimposed dc:** 150 V dc maximum (external source).

**Recorder output:** 0.1 V dc output at full scale, output resistance approx. 1 k $\Omega$ .

**Applied current (mA):** constant by range, 150/(full scale value in milliohms).

### General

**Power requirements:** 115/230 V  $\pm 10\%$ , 50 to 60 Hz, 1.5 VA.

**Weight:** 3.2 kg (7 lb).

**Size:** 155 mm H x 130 mm W x 280 mm D (6 $\frac{1}{2}$ " x 5 $\frac{1}{8}$ " x 11").

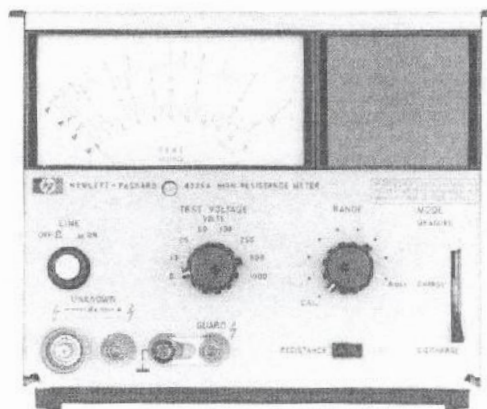
**Accessories furnished:** HP 16005A Probe, HP 16006A Probe, HP 16007A/B Test Leads and HP 16143A Probe Cable.

### Ordering Information

HP 4328A Milliohmmeter

Opt 001: Rechargeable battery operation

Opt 910: extra manual



HP 4329A

## Description

The HP 4329A is a solid-state insulation resistance meter designed for easy, accurate and direct readings of the very high resistance values typically found in synthetic resins, porcelain, insulating oils and similar materials. It is also useful for measurements in electrical components such as capacitors, transformers, switches and cables. Seven fully regulated dc test voltages (between 10 and 1000 Vdc) are provided as test sources.

The HP 4329A is instantly convertible from ungrounded-to-grounded-sample operation via a simple relocation of the front panel ground strap from "guard" to "+" position.

The HP 4329A also has a current measurement capability. Minute currents as low as 0.05 pA can be readily measured.

The HP 16008A Resistivity Cell, designed for use with the HP 4329A, can safely, rapidly and conveniently measure the volume and surface resistivity of sheet insulation materials (maximum sample size: 125 mm W x 125 mm D x 7 mm H).

## Specifications

### Resistance Measurement

**Range:** 500 k $\Omega$  to  $2 \times 10^{16} \Omega$ . (Depends on the test voltage).

**Accuracy:** total accuracy is determined by test voltage and range used. At low resistance end of each scale, accuracy is  $\pm 3\%$ , near center scale  $\pm 5\%$ , and near the specified upper limit on the meter scale (a quarter of full scale), accuracy is  $\pm 10\%$ . Accuracy is not specified above these limits. On all voltage ranges, if multiplier is set to Rmax., an additional  $\pm 3\%$  is included.

**Test voltages:** 10 V, 25 V, 50 V, 100 V, 250 V, 500 V and 1000 V  $\pm 3\%$ .

### Current Measurement

**Range:**  $5 \times 10^{-14}$  to  $2 \times 10^{-5}$  A in 8 ranges.

**Accuracy:**  $\pm 5\%$  of full scale deflection (there can be an additional  $\pm 3\%$  error at the top decade).

### General

**Recorder output:** 0 to 100 mV dc, proportional to meter deflection; 1 k $\Omega$  output resistance.

**Power:** 115/230 V  $\pm 10\%$ , 50-60 Hz, approximately 3 VA.

**Size:** 155 mm H x 198 mm W x 204 mm D (6 $\frac{1}{2}$ " x 7 $\frac{7}{8}$ " x 8 $\frac{1}{8}$ ").

**Weight:** 3.5 kg (7.7 lb).

**Accessory furnished:** HP 16117A Low Noise Test Leads.

**Accessory available:** HP 16008A Resistivity Cell.

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HP 16008A Resistivity cell

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Opt 910: extra manual