

COMPONENT MEASUREMENT

Multi-Frequency LCR Meters

Models 4274A & 4275A

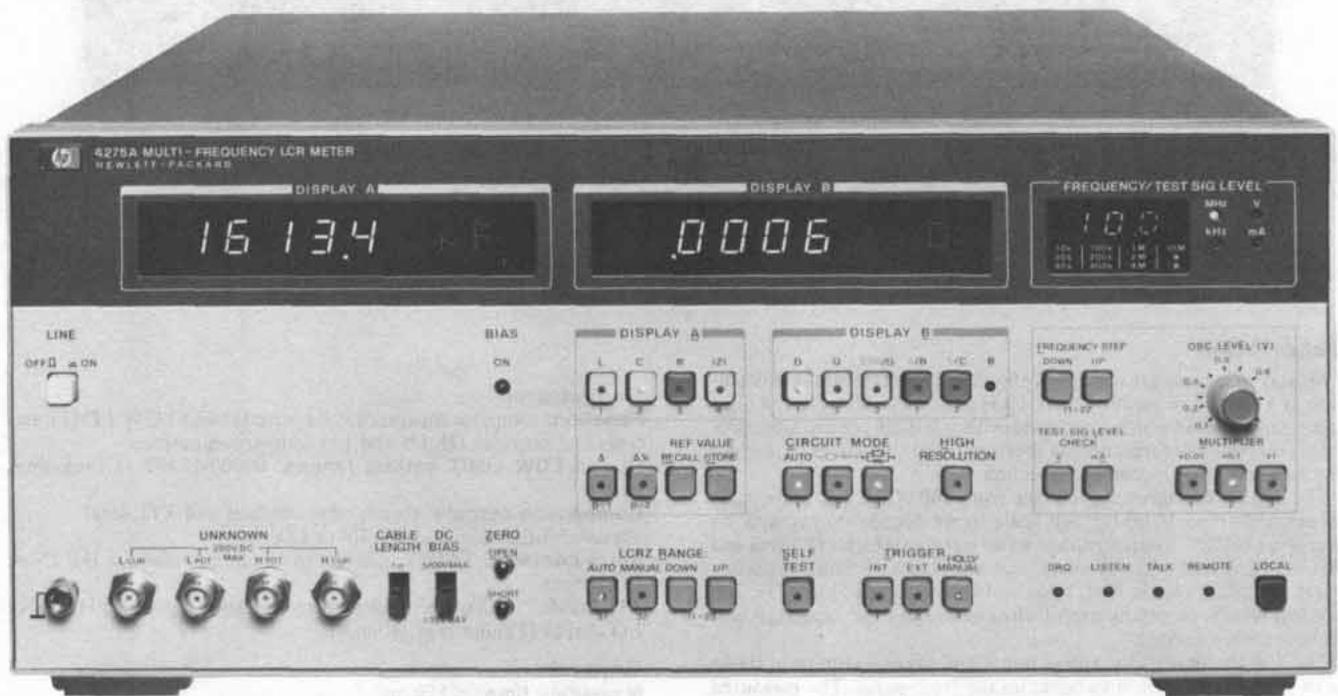
- Measure L/C - D/Q/ESR/G
R - X/B/L/C
Z - θ

4274A

- Test frequencies - 100 Hz to 100 kHz
- Test signal level - 1 mV to 5 V rms
- 0.1% basic accuracy

4275A

- Test frequencies - 10 kHz to 10 MHz
- Test signal level - 1 mV to 1 V rms
- 0.1% basic accuracy



4275A

Description

The 4274A and 4275A Multi-Frequency LCR Meters are the most recent additions to the new generation of microprocessor controlled LCR meters from Hewlett-Packard. Both instruments offer many unique features such as multi-spot frequencies, continuously variable test signal levels, multi-parameter measurements and basic accuracy of 0.1% with 4½ or 5½ (high resolution mode) digit resolution. These features, plus many others, allow the 4274A and 4275A to cover a wide variety of measurement requirements on most electronic materials and devices over a frequency range of 100 Hz to 10 MHz.

The 4274A operates over a frequency range of 100 Hz to 100 kHz and is ideally suited for such applications as impedance measurements on aluminum electrolytic capacitors used in switching power supplies and audio magnetic heads. The eleven spot frequencies allow the user to measure the frequency characteristics of the ESR of tantalum capacitors and make conventional measurements on discrete devices as specified in MIL and IEC specifications. L-Q measurements

on most inductors are easily made at specific frequencies and test current levels.

The 4275A meets the relatively high frequency measurement requirements of the electronic component and semiconductor industry, covering a frequency range of 10 kHz to 10 MHz in 10 spot frequencies. Applications include the L-Q measurement of magnetic components such as ferrite cores and filter coils as well as the capacitance, equivalent series resistance or impedance of tantalum, film or ceramic chip capacitors. Measurements such as impedance vs. frequency characteristics of VTR magnetic heads and high frequency C-V characteristics of semiconductor materials or devices can be made manually or under HP-IB control.

Both the 4274A and 4275A will contribute to the quality of component measurements in laboratory, quality control and production line applications. The selectable frequency, test signal level and optional dc bias capability allow the user to test a device under conditions similar to its intended use. The high resolution mode may be selected to give 5½ digit measurements without loss of accuracy.

Systems integration is easily accomplished with the two available HP-IB options (isolated and non-isolated). These interfaces offer the improved efficiency of total automation of complex measurements and arithmetic manipulation of measurement data. Two dc bias options are available covering the range of 0 to ± 100 Vdc to eliminate the need for external dc power supplies.

Together the 4274A and 4275A provide 17 discrete frequencies between 100 Hz and 10 MHz — wide enough to cover most impedance measurement applications. Additional spot frequencies are optionally available in the operating range of each instrument for unique customer applications.

Specifications (Tentative)

Common specifications (4274A & 4275A)

Parameter measured: L/C - D/Q/ESR/G
R - X/B/L/C
Z - θ

Display: 4½ digit, max. display 19999; (5½ digit, max. display 199999 in High Resolution mode).

Circuit Mode: Series, parallel or auto

Terminal configuration: 4-terminal pair

Trigger: INT, EXT and Hold/Manual

Range Mode: Auto or manual (up/down)

Deviation measurement: Difference from stored reference displayed as absolute value or per cent

High resolution mode: 5½ digit display (measurement speed times 10)

Zero adjustment: Compensates for residuals of test fixtures and cables ($C < 20$ pF, $G < 10 \mu\text{S}$, $L < 1 \mu\text{H}$, $R < 1 \Omega$)

Self test: Automatic operational check

DC bias: Internal: 0 - ± 35 V, 1 mV resolution (option 001)

Internal: 0 - ± 99.9 V, 100 mV resolution (option 002)

Bias control: HP-IB or 16203B Bias Controller

External: 0 - ± 200 V

Frequency/Test signal level check: Monitors frequency, test signal level or current at UNKNOWN terminals.

4274A Specifications (only)

Measurement frequencies: 100 Hz - 100 kHz in 1-2-4 steps (100 Hz, 120 Hz, 200 Hz, 400 Hz, 1 kHz, 2 kHz, 4 kHz, 10 kHz, 20 kHz, 40 kHz, 100 kHz $\pm 0.01\%$)

Test signal level: 1 mV - 5 Vrms continuously variable

Measurement range¹ and basic accuracy:

Inductance (L): 100.00 nH - 1000.0 H, 0.1%

Capacitance (C): 1.0000 pF - 1.00 F, 0.1%

Resistance (R), Impedance (Z), Equivalent Series

Resistance (ESR) and Reactance (X): 100.00 m Ω - 10.000 M Ω , 0.1%

Dissipation factor (D): .0001 - 9.999, ± 0.001

Quality factor (Q): 0.100 - 1000 (1/D)

Conductance (G) and Susceptance (B): 1.0000 μS - 100.00 S, 0.1%

Phase angle (θ): 0 - ± 180.00 degrees, 0.1 degree

4275A Specifications (only)

Measurement frequencies: 10 kHz - 10 MHz in 1-2-4 steps (10 kHz, 20 kHz, 40 kHz, 100 kHz, 200 kHz, 400 kHz, 1 MHz, 2 MHz, 4 MHz, 10 MHz $\pm 0.01\%$)

Test signal level: 1 mV - 1 Vrms, continuously variable

Measurement range¹ and basic accuracy:

L: 100.00 nH - 1.0000 H, 0.1%

C: 1.0000 pF - 100.00 μF , 0.1%

R, Z, ESR & X: 1.0000 Ω - 10.000 M Ω , 0.1%

D: .0001 - 9.999, ± 0.001

Q (1/D): .100 - 1000

G & B: 1.0000 μS - 10.000S, 0.1%

θ : 0 - ± 180 degrees, 0.1 degree

General

Measurement time: Approx. 200 ms (< 1 kHz); 4274A only
Approx. 130 ms (1 kHz - 10 MHz); 4274A & 4275A

Power: 100/120/220 Vac $\pm 10\%$, 240 Vac $+5\%$ - 10% , 48 - 66 Hz

Size: 177 mm H x 425.5 mm W x 574 mm D (6.969" x 16.7" x 22.6")

Weight: Approx. 18 kg (39.7 lbs)

Accessories available

16047A Test Fixture; general purpose, direct coupled

16047B Test Fixture; safety guarded with extension cables

16048A Test Leads; BNC connectors

16048B Test Leads; RF connectors

16048C Test Leads; alligator clips

16034B Test Fixture; for chip capacitors

16023B DC Bias Controller

Options

001: Internal DC Bias Supply, 0 - ± 35 V, 1 mV steps

002: Internal DC Bias Supply, 0 - ± 99.9 V, 100 mV steps

003: Battery Backup for Memory Circuits

004: Frequency steps in 1-3-5 sequence

101: HP-IB data output and remote control

102: HP-IB with isolation

Special options

H01: High speed version (3 digit display); 1-2-4 steps

H02: High speed version (3 digit display); 1-3-5 steps

Additional specific frequency options (no option number assigned):

Selectable arbitrarily from 100 Hz thru 100 kHz on 4274A, 10 kHz thru 10.7 MHz on 4275A.

4274A Multi-Frequency LCR Meter

Price

\$7930

4275A Multi-Frequency LCR Meter

\$8720

¹Varies with test frequency and test signal level. Range for minor parameters of ESR, G, X, B, L and C depends upon range of major L, C and R parameters.