Decade

Series 1417 Capacitor

Capacitance Standard up to 1F

USES:

- A Laboratory Standard
- Standard for Dissipation Factor
- Verification & Calibration of LCR Meters
- Working Standard
- Verification of Calibration of LCR Meters
- Capacitance Measurement Functions
- For Calibrating Instrumentation

FEATURES:

- F to 1F in decade steps
- 0.25% direct-reading capacitance accuracy
- 0.1% or better ratio accuracy
- Dissipation-factor standard

Introduction

The 1417 Four-Terminal Capacitance Standard consists of a 1μF standard capacitor and two precise inductive voltage dividers used to scale the value of the 1μF capacitor up to 1F in decade steps. This arrangement provides accuracy and stability unattainable with very high-value true capacitors.

Description

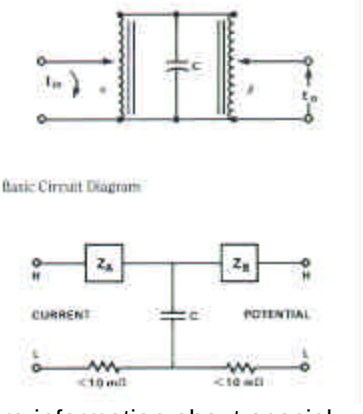
In addition to the seven direct-reading capacitance values, an infinite number of intermediate or higher capacitance values can be obtained by using external capacitors. An external capacitor is simply connected to the 1417's external standard terminals, either directly or in parallel with a 1μF internal standard, and the resulting capacitance is scaled in value by the 1417's inductive voltage dividers.

The direct-reading accuracy of the 1417 is ±0.25% plus ratio accuracy at test frequencies of 100, 120, or 1000Hz. Since the 1417 scaling ratios are precise and repeatable, better accuracy can be obtained by measuring the actual value of the internal 1μF standard or of an external standard before scaling.

The 1417 also serves as a standard of dissipation factor (D). The dissipation factor of the 1417 is intentionally set to 0.01 at test frequencies of 100, 120 and 1000Hz. Basic D accuracy at these frequencies is ±0.001.

The 1417 may also be used as a two-terminal capacitance standard when higher D values can be tolerated. In a two-terminal configuration, D is less than 1 for capacitance values up to 1000μF at frequencies below 150Hz. This feature allows the 1417 to be used in calibrating the higher capacitance ranges of popular universal or RLC bridges.

One additional feature of importance is that all the 1417's parameters are measurable (without disassembly) so, in effect, its ultimate accuracy depends on the accuracy of the external measurement equipment.



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Series 1417 Four-Terminal Capacitance Standard

Capacitance Value (Internal Standard)	Ratio Accuracy 100 & 120Hz	Ratio Accuracy 1 kHz	D Accuracy 100 & 120Hz	D Accuracy 1 kHz	Approximate Terminal Impedance ZA (Ω)	Approximate Terminal Impedance ZB (Ω)	E Max* AC (V) *DC Voltage cannot be applied
1µF	----------	--------	±0.001	±0.001	0.03	0.03	20
10µF	0.02%	0.04%	±0.001	±0.001	7.0	15.5	6
100µF	0.02%	0.04%	±0.001	±0.001	3.1	6.4	2
1mF	0.02%	0.06%	±0.001	±0.002	1.1	2.2	0.8
10mF	0.03%	0.2%	±0.001	±0.005	0.37	0.72	0.5
100mF	0.1%	--------	±0.003	---------	0.13	0.23	0.25
1F	0.25%	--------	±0.01	---------	0.04	0.05	0.06

Capacitance: Internal Standard: 1µF in 7 switch-selected decade values.
External Standard: Indicated capacitance, multiplied by C ext/1µF.

Capacitance Accuracy, Direct-Reading:

0.25% plus ratio accuracy at 100Hz, 120Hz, and 1kHz, 20 to 25°C, with low applied voltage (< ¼ E max) using internal standard and a proper four-terminal measurement. (May also be used as a two-terminal standard, with a D<1 and a capacitance change from the four-terminal value of < ½% up to 1 mF at 120Hz or less.)

Capacitance Ratio: Accuracy See table above.

Dissipation Factor: 0.01 at 100Hz. 120Hz and 1kHz. For D accuracy, see table.

Terminal Impedance: See figure and table (approximate values given).

Temperature Coefficient:
Approximately -140ppm/ °C.

Voltage Characteristic: Approximately +0.3% change from 0_V to E max (see table) at 100Hz. Less at higher frequencies.

Mechanical: Bench cabinet.

Dimensions: (w x h x d): 8.5 x 5.9 x 5.25in (215 x 147 x 132mm).

Weight: 6 lbs. (2.7kg) net, 11 lbs. (5kg) shipping.

Ordering Information

1417 Four-Terminal Capacitance Standard

Catalog Number	Item
1417-9700	Four-Terminal Capacitance Standard

Includes:
Calibration Certificate Traceable to NIST

Optional Accessories:
Calibration Data

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