

## 1403 Series

### High frequency capacitance standards

#### Features:

- High frequency capacitance standard
- Air capacitor
- Available in 0.001 pF to 1000 pF
- 500 ppm/year stability
- Extremely low dissipation factor

**New**



Model 1403 1 pF-BNC Standard Capacitor and 1403 0.001 pF-BNC Standard Capacitor      Model 1403 100 pF Standard Capacitor

## DESCRIPTION

For measurement at 100 pF and below, a three terminal connection increases the accuracy by eliminating the uncertainty in the measurement introduced by the capacitances between the capacitor terminals and ground.

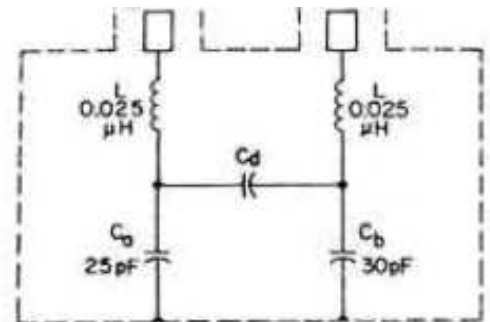
The type 1403 Standard Air Capacitors are stable, three-terminal standards in decimal values from 0.001 to 1000 pF. Their terminals are arranged to plug directly into the UNKNOWN terminals of the Type 1620 Capacitance Bridge or equivalent such as AH2500A Ultra Precision Capacitance Bridge.

The three largest sizes are similar in construction to the Type 1404.

The smaller capacitance units are made up of two plates, with a grounded plate between them; an aperture in the grounded plate determines the magnitude of the direct capacitance.

Dielectric losses are extremely low as there is no solid dielectric in the direct-capacitance field.

All have shielded terminals, both of which are connected to the case.



**Figure 1**

Equivalent circuit showing direct capacitance,  $C_d$ , and average values of residual inductance,  $L$ , and terminal capacitances,  $C_a$  and  $C_b$ .

### SPECIFICATIONS

**Calibration:** An certificate of calibration is supplied with each capacitor traceable to the SI, giving the measured direct capacitance and Df at 1 kHz, 15 Vac and 23° ±1°C.

| Model            | Nominal Capacitance | Adjustment Accuracy | Maximum Voltage        | Dissipation Factor     |
|------------------|---------------------|---------------------|------------------------|------------------------|
| 1403-A           | 1000 pF             | ±0.1%               | 700 V peak             | < 20 x10 <sup>-6</sup> |
| 1403-D           | 100 pF              |                     | 1500 V peak            | < 20 x10 <sup>-6</sup> |
| 1403-G           | 10 pF               |                     |                        | < 30 x10 <sup>-6</sup> |
| 1403-K           | 1 pF                |                     | < 20 x10 <sup>-6</sup> |                        |
| 1403-1pF-BNC     | 1 pF                | ±0.3%               | 500 V peak             | < 20 x10 <sup>-6</sup> |
| 1403-N           | 0.1pF               |                     | 1500 V peak            | < 20 x10 <sup>-6</sup> |
| 1403-R           | 0.01 pF             |                     |                        | < 20 x10 <sup>-6</sup> |
| 1403-V           | 0.001 pF            | ±1%                 | 500 V peak             | < 20 x10 <sup>-6</sup> |
| 1403-0.001pF-BNC | 0.001 pF            |                     |                        | < 20 x10 <sup>-6</sup> |

#### Temperature Coefficient of Capacitance:

Typically ±(20 to 40) ppm/°C, between 20°C and 70°C

**Stability:** Capacitance change is less than 0.05% per year.

**Residual impedance:** See equivalent circuit and plot on page 1

**Terminals:** Two GR874 coaxial connectors

Two bnc-f connectors for 1403-1pF-BNC and 1403-0.001 pF-BNC

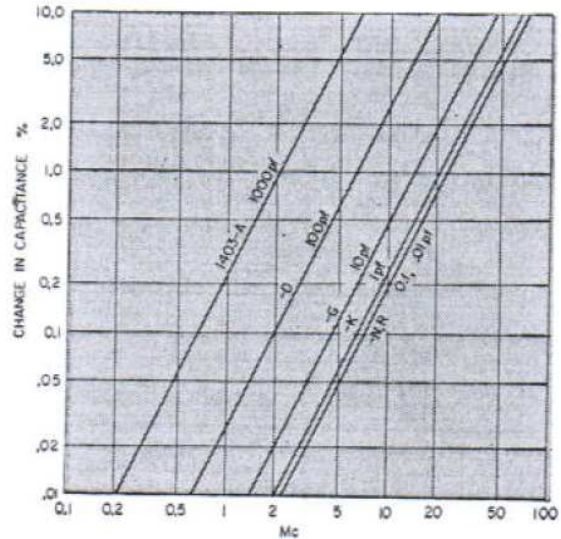
Outer shell of connectors are connected to case ground to provide complete shielding of the leads.

#### Mechanical:

Diameter 3.0625 in (78 mm), height 4.875 in (125 mm), over-all.

**Net weight:** 1 lbs (0.5 kg)

**Shipping weight:** 4 lbs (1.9 kg)



**Figure 2**

Percentage change in effective capacitance, with frequency produced by residual inductance.  
 (1403-1pF-BNC has the same change as 1403-K)  
 (1403-0.001pF-BNC has the same change as 1403-V)

### ORDERING INFORMATION

1403-9701 1403-A, 1000 pF  
 1403-9704 1403-D, 100 pF  
 1403-9707 1403-G, 10 pF  
 1403-9711 1403-K, 1 pF  
 1403-1pF-BNC 1 pF

1403-9714 1403-N, 0.1 pF  
 1403-9718 1403-R, 0.01 pF  
 1403-9722 1403-V, 0.001 pF  
 1403-0.001pF-BNC 0.001 pF

