

1413 Precision Decade Capacitor is a high-quality, high-accuracy, high-stability, wide-range standard. It is ideal for verification and calibration of LCR meters and multimeters.

Manufactured using the same design as the original GenRad 1413 Precision Decade Capacitor.



1413 Precision Decade Capacitor

For greater range and flexibility see the [HACS-Z Series](#)

### Features

- Capacitance Range: 1 pF to 1.111 11 μF
- Base Accuracy: 0.05%
- Resolution: 6 digits
- Zero-Capacitance: <0.1 pF
- Stability: 100 ppm/year
- TC: <20 ppm/°C
- Rack mounting available
- Front and rear outputs available

### SPECIFICATIONS:

| Capacitance per step              | Total decade capacitance | Accuracy*       | Stability                    | Max Voltage                 | Dissipation factor*  | Capacitor type  |
|-----------------------------------|--------------------------|-----------------|------------------------------|-----------------------------|--|---|
| <b>HACS-Z-1pF Variable Decade</b> | 1 pF+                    | ±0.1 pF         | ±(100 ppm + 0.1 pF) per year | 500 V peak max up to 10 kHz | <0.003 typical   | Air Capacitors  |
| <b>1 pF</b>                       | 10 pF                    | ±(0.05%+0.5 pF) |                              |                             | <0.002   |   |
| <b>10 pF</b>                      | 100 pF                   |                 |                              |                             | <0.002   |   |
| <b>100 pF</b>                     | 1 nF                     |                 |                              |                             | Position 1: <0.002<br>All others: <0.001                         | Silvered mica<br>Mechanically stabilized<br>Hermetically sealed |
| <b>1,000 pF</b>                   | 10 nF                    |                 |                              |                             | Position 1: <0.001<br>Position 2: <0.0005<br>All others: <0.0003 |   |
| <b>0.01 μF</b>                    | 100 nF                   |                 |                              |                             | <0.0003  |   |
| <b>0.1 μF</b>                     | 1 μF                     |                 |                              |                             | <0.0004  |   |

\*1 kHz, 3-terminal measurement; series model; 1 Vrms, 23°C; traceable to SI

No zero-subtraction required

#### Zero capacitance:

≤0.1 pF maximum capacitance obtained with all dials set to zero

#### Temperature coefficient:

<20 ppm/°C

#### Insulation resistance:

>50,000 MΩ

#### Environmental conditions:

**Operating conditions:** 10°C to 40°C

**Storage conditions:** -40°C to 70°C

#### Shielding:

Double-shielded construction; see below.

#### Dimensions:

**Bench:** 43.2 cm W x 13.3 cm H x 27.7 cm D (17" x 5.2" x 10.9")

**Rack:** 48.3 cm W x 13.3 cm H x 27.7 cm D (19" x 5.2" x 10.9")

#### Weight:

8.6 kg (19 lb), for bench version

#### Connection to capacitor:

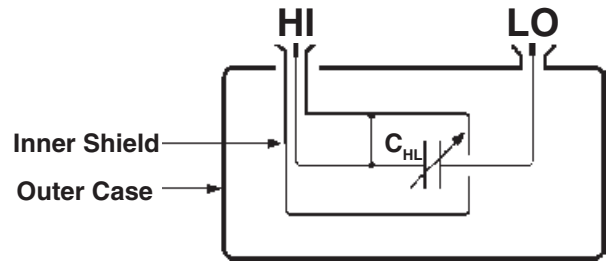
Two bnc connectors labeled **HI** and **LO** are located on the front panel.



### DOUBLE SHIELDED CONSTRUCTION

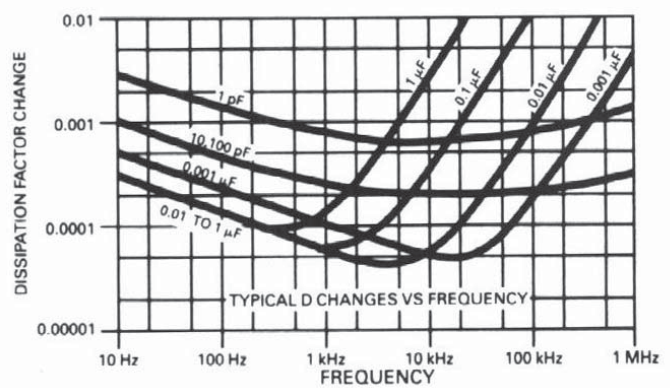
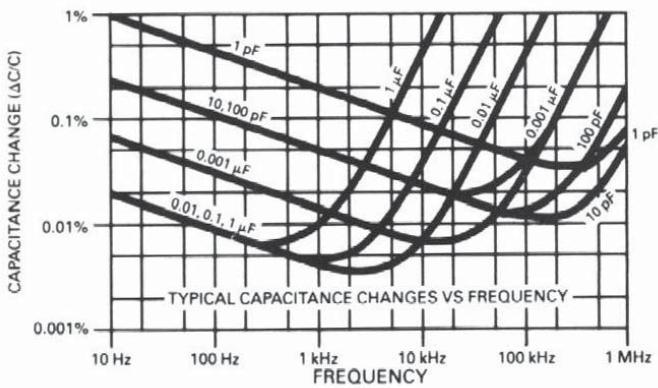
The shielding is divided into two different parts: an inner shield that minimizes the low terminal-to-guard capacitance, and an outer shield (the case) that minimizes the detector input capacitance and noise.

The outer shell of the **HI** connector is connected to the switch shaft. The outer shell of the **LO** connector is connected to the outer case. When these two shields are connected together, the 1413 becomes an excellent 3-terminal capacitance substituter with low zero capacitance.



Double Shielded Construction

### FREQUENCY CHARACTERISTICS



### MAX TERMINAL CAPACITANCE

| Capacitance values       | 1 pF - 100 pF   | 101 pF - 1000 pF   | 1001 pF - 2000 pF   | 2001 pF - 0.1 μF   | >0.1 μF  |
|--------------------------|---|--|---|--|--|
| Max terminal capacitance | HIGH to Case: 4 pF<br>HIGH to GUARD: 85 pF<br>LOW to GUARD: 45 pF | HIGH to Case: 8 pF<br>HIGH to GUARD: 110 pF<br>LOW to GUARD: 70 pF | HIGH to Case: 10 pF<br>HIGH to GUARD: 125 pF<br>LOW to GUARD: 80 pF | HIGH to Case: 30 pF<br>HIGH to GUARD: 165 pF<br>LOW to GUARD: 110 pF | HIGH to Case: 60 pF<br>HIGH to GUARD: 200 pF<br>LOW to GUARD: 120 pF |

### ORDERING INFORMATION

Precision Decade Capacitor - Benchtop Model: **1413-9700**  
 Precision Decade Capacitor - Rack Mount Model: **1413-9701**

#### Optional

For rear output option, add -RO at the end of part number.

