

# Decade

## USES:

- For Calibrating Working Standards
- Verification & Calibration of LCR Meters
- Working Standard
- Inductance Measurement Functions
- Verification of Calibration of Multimeters
- For Calibrating Instrumentation
- For Substitution Inductance Measurements

## FEATURES:

- Shielded toroidal cores for small mutual inductance and minimal effect from external fields
- Sealed against moisture for long-term stability
- Excellent as a moderately precise standard of inductance .
- High-Q, 200 and above



# Series 1491 Inductor

## All-Purpose Inductor for Design and Measurement

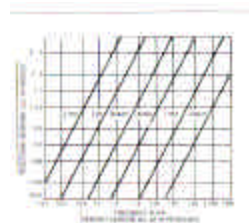
### Introduction

The 1491 Decade Inductor is an assembly of several Decade-Inductor Units in a single metal cabinet. The units have no electrical connection to the panel, but a separate ground terminal is provided, which can be connected to the adjacent low terminal, leading to the smallest decade.

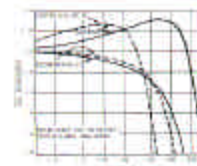
### Description

These inductance decades are convenient elements for use in wave filters, equalizers, and tuned circuits throughout the range of audio and low radio frequencies. As components in oscillators, analyzers, and similar equipment, they are especially useful during the preliminary design period, when you need to vary circuit elements over relatively wide ranges to determine optimum operating values. As moderately precise standards of inductance they have values of low-frequency storage factor, Q, that are much larger than those of air-core coils.

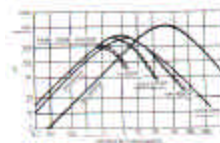
**Figure 1:** Percentage change in normal and incremental inductance with AC and bias current. Incremental curve is limited to an AC excitation less than  $I_1$ .



**Figure 2:** Variation of inductance with frequency for the 1491 Decade Inductors.



**Figure 3:** Variation of Q for the maximum inductance at low excitation levels. Dashed curves correspond to use with chassis floating.



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## Series 1491 Decade Inductor

### Frequency Characteristics:

Percentage increase in effective series inductance (above the zero-frequency value,  $L_0$ ) may be obtained by interpolation in accompanying graph (see Figure 2) for any setting of the highest-value decade used, when LOW terminal is grounded to cabinet.

Zero Inductance: Approximately 1 $\mu$ H.

Maximum Voltage: 500V rms. Switch will break circuit at 500V if turned rapidly, but voltages above 150V may cause destructive arcing with switch between detent positions.

Accuracy (Low Frequency, Low Signal Level):

### Inductance Per Step

| Model     | 100 $\mu$ H | 1mH   | 10mH    | 100mH   | 1H      |
|-----------|-------------|-------|---------|---------|---------|
| 1491-9704 | N/A         | +/-2% | +/-1.6% | +/-0.8% | +/-0.8% |
| 1491-9707 | +/-2%       | +/-2% | +/-1.6% | +/-0.8% | +/-0.8% |

### Change in Inductance with Current:

Fractional change in initial inductance with AC current for each type of toroid is shown in the normal curves, Figure 1, in terms of the ratio of the operating current,  $I$ , to  $I_1$  the current for 0.25% change, solid line (0.1%, broken line). For ratios below unity, inductance change is directly proportional to current. Values of  $I_1$ , listed below, are approximate and are based on the largest inductor in the circuit for each setting.

### Incremental Inductance:

DC bias current  $I_B$  will reduce the initial inductance as shown in the incremental curves, Figure 1.

| Switch Setting | RMS $I_1$ (mA) |      |                     |       |      |
|----------------|----------------|------|---------------------|-------|------|
|                | 0.1% Increase  |      | 0.25% Increase      |       |      |
|                | 100 $\mu$ H    | 1mH  | Inductance per Step |       |      |
|                |                |      | 10mH                | 100mH | 1H   |
| 1              | 141            | 17   | 5.4                 | 1.7   | .54  |
| 2,3,4          | 100            | 12   | 3.8                 | 1.2   | .38  |
| 5,6,7,8,9,10   | 63             | 8    | 2.4                 | 0.8   | 0.24 |
| Maximum I      | 4A             | 1.5A | 500mA               | 150mA | 50mA |

Storage Factor Q: See Figure 3.

DC Resistance: Approximately 45 $\Omega$  per Henry.

### Temperature Coefficient:

Approximately -25ppm per degree C between 16° and 32°C.

Terminals: Binding posts on 3/4-in centers; separate ground terminal provided.

Mechanical: Lab-bench cabinet.

Dimensions: (w x h x d): 17 x 8.75 x 6.5in (432 x 223 x 166mm).

Weight: 

- 1491-D, bench model, 23 lbs. (11kg) net, 30 lbs (14kg) shipping
- 1491-G, bench model, 27 lbs (12kg) net, 34 lbs (16kg) shipping

## Ordering Information

### 1491 Decade Inductor

| Catalog Number | Item                   | Total  | Steps  |
|----------------|------------------------|--------|--------|
| 1491-9704      | 1491-D Decade Inductor | 11.11H | 0.001H |
| 1491-9707      | 1482-G Decade Inductor | 11.11H |        |
|                | 0.0001H                |        |        |

**Includes:**  
Calibration Certificate Traceable to NIST

**Optional Accessories:**  
Calibration Data



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