This supplement contains information for correcting manual errors and for adapting the manual to newer instruments that contains improvements or modifications not documented in the existing manual.

To use this supplement
1. Make all ERRATA corrections
2. Make all appropriate serial-number-related changes listed below

<table>
<thead>
<tr>
<th>SERIAL PREFIX OR NUMBER</th>
<th>MAKE MANUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1</td>
</tr>
</tbody>
</table>

◆ New Item

ERRATA

CHANGES 1

Change the company name from Hewlett-Packard or its abbreviation HP to Agilent Technologies.

CHANGE 1 contains the information needed to adapt the 16380A’s manual.

Page 1-6, Table 1-6. Other Supplemental Performance Characteristics

Change the Table 1-6 as follows.

<table>
<thead>
<tr>
<th>MODEL CAPACITANCE</th>
<th>16381A 1 pF</th>
<th>16382A 10 pF</th>
<th>16383A 100 pF</th>
<th>16384A 1000 pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Stability</td>
<td>≤ 300 ppm/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitance Temperature Coefficient (Typical)</td>
<td>+ 40 ppm/°C</td>
<td>+ 30 ppm/°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Allowable Voltage</td>
<td>±40V peak max. (AC + DC)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1: at 1 kHz and 23°C ± 5°C

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Agilent Technologies recommends that you periodically request the latest edition of this supplement. Free copies are available from all Agilent Technologies offices. When requesting copies, quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.
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Manual Printing History

The manual's printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates that are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

April 1990        First Edition (part number: 16380-90001)

Warranty and Assistance

All Agilent Technologies products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the Operation Manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Agilent Technologies. No other warranty is expressed or implied. We are not liable for consequential damages.

For any assistance, contact your nearest Agilent Technologies Sales and Service Office. Addresses are provided at the back of this manual.
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GENERAL INFORMATION

Introduction

This operation and service manual provides complete information on the HP 16380A Standard Air Capacitor Set. Figure 1-1 shows the HP 16380A, along with all furnished accessories.

![Diagram of HP 16380A and accessories]

- **Case PN 16380-85101**
- **HP 16382A (10 pF)**
- **HP 16384A (1000 pF)**
- **HP 16381A (1 pF)**
- **HP 16383A (100 pF)**

**BNC (f)-(f) Adapters, 4ea: PN 1250-0080**

Figure 1-1. HP 16380A and Its Furnished Accessories
Description

The HP 16380A Standard Air Capacitor Set consists of four precision capacitors—1 pF (HP 16381A), 10 pF (HP 16382A), 100 pF (HP 16383A) and 1000 pF (HP 16384A). All four capacitors have high capacitance stability and are virtually unaffected by changes in environmental temperature, ensuring measurement repeatability and reliability.

The HP 16380A was designed for use in calibrating precision impedance measuring instruments (such as LCR meters, impedance analyzers, etc.) that have capacitance ranges between 1 pF and 1000 pF. The HP 16380A can be used to directly certify capacitance measurement accuracy over the 1 pF to 1000 pF range.

The HP 16380A can be connected directly to the measurement terminals of impedance measuring instruments that have the 4-terminal pair configuration. Other terminal configurations, such as 3-terminal and 5-terminal, can also be accommodated by using test leads and the furnished BNC adapters.

Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically. The contents of the shipment should be as shown in Figure 1-1. If the shipment is incomplete, or if there is mechanical damage or defects, notify the nearest Hewlett-Packard office. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping materials for carrier’s inspection. The HP office will arrange for repair or replacement, without waiting for claim settlement.

Packaging

Original Packaging

Containers and materials identical to those used in factory packaging are available from Hewlett-Packard. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Also, mark the container FRAGILE to ensure careful handling. In any correspondence, refer to the unit by model number and full serial number.
Other Packaging

The following general instructions should be used for re-packing with commercially available materials:

a. If shipping to Hewlett-Packard office or service center, attach a tag indicating the type of service required, return address, model number, and full serial number.

b. Use a strong shipping container. A double-walled carton made of 350 pound test material is adequate.

c. Use enough shock absorbing material (3- to 4-inch layer) around all sides of the case to provide a firm cushion and to prevent movement inside the container.

d. Seal the shipping container securely.

e. Mark the shipping container FRAGILE to ensure careful handling.

f. In any correspondence, refer to the unit by model number and full serial number.

Specifications

This section gives complete specifications for the HP 16380A Standard Air Capacitor Set. The specifications listed in Table 1-1 are the performance standards or limit against which the HP 16380A is tested. When the HP 16380A is shipped from the factory, it satisfies the specifications listed in Table 1-1. All accessories furnished with HP 16380A are listed in Table 1-3.

Table 1-1. HP 16380A Specifications

<table>
<thead>
<tr>
<th>MODEL</th>
<th>HP 16381A</th>
<th>HP 16382A</th>
<th>HP 16383A</th>
<th>HP 16384A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance ¹</td>
<td>1 pF</td>
<td>10 pF</td>
<td>100 pF</td>
<td>1000 pF</td>
</tr>
<tr>
<td>Nominal Accuracy ¹</td>
<td>± 0.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissipation Factor ¹</td>
<td></td>
<td>&lt; 0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimension ²</td>
<td>142mm(W) x 88mm(D) x 112mm(H)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight ³</td>
<td>1.3 kg</td>
<td>1.4 kg</td>
<td>1.5 kg</td>
<td></td>
</tr>
</tbody>
</table>

¹: Specified at 1 kHz under ambient conditions: Temperature 23°C ± 5°C, Relative Humidity 50% ± 20%

²: Dimension of Carrying Case: approximately 360mm(W) x 370mm(D) x 190mm(H) (including dimensions of handle, buckle, and foot)

³: Total Weight: approximately 8.0 kg (including four capacitance standards, a carrying case, and four BNC adapters)
Table 1-2. Operating Conditions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>23°C ± 5°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>50% ± 20%</td>
</tr>
</tbody>
</table>

Table 1-3. HP 16380A Furnished Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNC(f)-(f) Adapter</td>
<td>4</td>
<td>PN 1250-0080</td>
</tr>
<tr>
<td>Carrying Case</td>
<td>1</td>
<td>PN 16380-85101</td>
</tr>
<tr>
<td>Operation and Service Manual</td>
<td>1</td>
<td>PN 16380-90001</td>
</tr>
</tbody>
</table>

Supplemental Performance Characteristics

HP 16380A Supplemental Performance Characteristics are given in this section. The Supplemental Performance Characteristics are not specifications, but are typical characteristics included as additional information for the user.

Capacitance Frequency Characteristics

The capacitance frequency characteristics of HP 16380A defined as four-terminal pair admittance standards are shown in Figure 1-2 and Figure 1-3.

The capacitance frequency characteristics represent the percent capacitance deviation from the calibrated capacitance value at a frequency of 1 kHz to the typical capacitance values at frequencies above 1 kHz.

![Graph showing capacitance frequency characteristics](image)

Figure 1-2. 10 pF, 100 pF, and 1000 pF Frequency Characteristics
Stray Capacitance to Guard

The typical stray capacitance to guard of the capacitance standards in the HP 16380A are listed in Table 1-4.

Table 1-4. Stray Capacitance to Guard (Typical)

<table>
<thead>
<tr>
<th>MODEL CAPACITANCE</th>
<th>HP 16381A 1 pF</th>
<th>HP 16382A 10 pF</th>
<th>HP 16383A 100 pF</th>
<th>HP 16384A 1000 pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&lt;sub&gt;HG&lt;/sub&gt; ¹</td>
<td>17 pF</td>
<td>25 pF</td>
<td>31 pF</td>
<td>33 pF</td>
</tr>
<tr>
<td>C&lt;sub&gt;LG&lt;/sub&gt; ¹</td>
<td>48 pF</td>
<td>29 pF</td>
<td>32 pF</td>
<td>34 pF</td>
</tr>
</tbody>
</table>

¹: See Figure 1-4 below.

Figure 1-4. Equivalent Circuit
Storage Environment
The HP 16380A may be stored or shipped under the environmental conditions listed in Table 1-5.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>-15°C to +65°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Humidity</td>
<td>&lt; 80%</td>
</tr>
</tbody>
</table>

The HP 16380A must be protected from temperature extremes which could cause condensation.

Other Characteristics
Other HP 16380A Supplemental Performance Characteristics are listed in Table 1-6.

<table>
<thead>
<tr>
<th>MODEL CAPACITANCE</th>
<th>HP 16381A 1 pF</th>
<th>HP 16382A 10 pF</th>
<th>HP 16383A 100 pF</th>
<th>HP 16384A 1000 pF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Stability ¹</td>
<td>≤ 300 ppm/year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacitance Temperature Coefficient ¹ (Typical)</td>
<td>+40 ppm/°C</td>
<td>+30 ppm/°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Allowable Voltage</td>
<td></td>
<td></td>
<td>700 V peak</td>
<td></td>
</tr>
</tbody>
</table>

¹: at 1 kHz and 23°C ± 5°C
CALIBRATION AND REPAIR

Introduction

This section provides the calibration and repair information for the HP 16380A Standard Air Capacitor Set.

Calibration

Hewlett-Packard will calibrate the HP 16380A. For complete information (price, time required, etc.) on how to have the HP 16380A calibrated, contact the nearest Hewlett-Packard Sales and Service Office

Recommended Calibration Cycle

The HP 16380A should be calibrated at least once a year. More frequent calibration may be required if the HP 16380A is used in very hot or very cold environments.

Repair

The HP 16380A contains no replaceable components. If one of the capacitors becomes damaged, or if its capacitance value is outside specified limits, the capacitor must be replaced. For complete information on service, contact the nearest Hewlett-Packard Sales and Service Office.
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