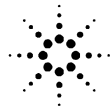


Agilent 16380C Capacitance Standard Set

Operating Note

Fifth Edition



Agilent Technologies

Agilent Part No. 16380-90221

June 2001

Printed in Japan

Notices

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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.

1985	First Edition (part number: 16380-90200)
November 1998	Second Edition (part number: 16380-90201)
March 2000	Third Edition (part number: 16380-90201)
November 2000	Fourth Edition (part number: 16380-90211)
June 2001	Fifth Edition (part number: 16380-90221)

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

NOTE

16380C comply with INSTALLATION CATEGORY I and POLLUTION DEGREE 2 in IEC61010-1. 16380C are INDOOR USE product.

- DO NOT Substitute Parts Or Modify Instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

- Dangerous Procedure Warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

Safety Symbol

General definitions of safety symbols used on the instrument or in manuals are listed below.



Instruction Manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instrument manual.

WARNING

This warning sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

CAUTION

This Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE

Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility, or to the calibration facilities of other International Standards Organization members.

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its

component products. Instruments are warranted for a period of one year. Fixtures and adapters are warranted for a period of 90 days. During the warranty period, Agilent Technologies Company will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instruction when properly installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

IMPORTANT

No other warranty is expressed or implied. Agilent Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Agilent Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

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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1 **General Information**

Description

The Agilent 16380C Capacitance Standard Set consists of three precision capacitors 0.01 μF (16385A), 0.1 μF (16386A), and 1 μF (16387A). One precision capacitor 10 μF (16388A) is also added with the option. All four capacitors have high capacitance stability and are virtually unaffected by changes in environmental temperature, ensuring measurement repeatability and reliability.

The 16380C was designed for use in calibrating precision impedance measuring instruments (such as LCR meters, impedance analyzers, etc.) that have capacitance ranges between 0.01 μF and 10 μF . The 16380C can be used to directly certify capacitance measurement accuracy over the 0.01 μF to 10 μF range.

Contents

The 16380C contents are listed in Table 1-1.

Table 1-1

Description	Agilent Part No.	Qty.
16385A (0.01 μF)	Not Assigned	1
16386A (0.1 μF)	Not Assigned	1
16387A (1 μF)	Not Assigned	1
16388A (10 μF) (option 001)	Not Assigned	1
BNC(f)-(f) Adapters	1250-0080	4
Case	16380-85104	1
Calibration Report	Not Assigned	1
Operating Note (This Manual)	16380-90221	1

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 Table 1-1. If the shipment is incomplete, or if there is mechanical damage or defects, notify the nearest Agilent office. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as the Agilent office. Keep the shipping materials for carrier's inspection. The Agilent office will arrange for repair or replacement at Agilent Option, without waiting for claim settlement.

2 **Specifications and Supplemental
Performance Characteristics**

Specifications

Table 2-1

Model	16385A	16386A	16387A	16388A (opt.001)
Nominal Value ^{*1}	0.01 μ F	0.1 μ F	1 μ F	10 μ F
Nominal Accuracy ^{*1}	$\pm 0.1\%$			$\pm 0.05\%$
Dissipation Factor ^{*1}	$\leq 4 \times 10^{-4}$	$\leq 5 \times 10^{-4}$	$\leq 7 \times 10^{-4}$	$\leq 5 \times 10^{-4}$

*1. Specified at 1kHz under the following ambient conditions:
 Temperature: $23 \pm 5^\circ\text{C}$

Operating Conditions

Ambient Temperature: $23 \pm 5^\circ\text{C}$

Relative Humidity: Less than 70% RH

Dimensions

16385A, 16386A, 16387A, and 16388A (opt.001): 142(W) \times 88(D) \times 112(H) mm

Carrying Case: 355(W) \times 340(D) \times 170(H) mm

Weight

16385A, 16386A, and 16387A: approximately 1.3 kg each

16388A (opt.001): approximately 1.7 kg

Total: approximately 7.0 kg

(Includes three capacitance standards, a carrying case, and four BNC adapters)

approximately 8.7 kg

(Includes four capacitance standards, a carrying case, and four BNC adapters)

Accessories Furnished

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

Carrying Case, 1ea.: PN 16380-85104

Operating Note, 1ea.: PN 16380-90221

Supplemental Performance Characteristics

Capacitance Temperature Coefficient

16385A, 16386A, 16387A, and 16388A (opt.001): -20 to 35 ppm/°C

Capacitance Stability

16385A, 16386A, 16387A, and 16388A (opt.001): <50ppm/year @ 1kHz, 23±5°C

Maximum Allowable Voltage/Current

16385A, 16386A, 16387A, and 16388A (opt.001): 40 V peak (ac+dc)/100 mA rms

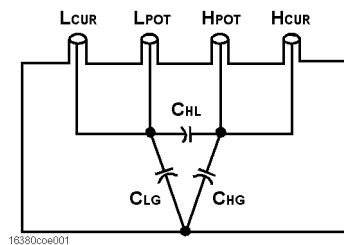
Residual Capacitance

Table 2-2

	16385A	16386A	16387A	16388A (opt.001)
C_{HG}^{*1}	<20 pF	<20 pF	<35 pF	<50 pF
C_{LG}^{*1}	<20 pF	<20 pF	<35 pF	<50 pF

*1.: See figure below.

Figure 2-1



C_{HL} : 4 terminal capacitance

C_{HG} , C_{LG} : Stray capacitance to guard

Storage Conditions

Temperature: -10°C to +55°C

Relative Humidity: Less than 85% RH at 40°C

3 **Service**

Calibration

Agilent will calibrate the 16380C. For complete information (price, time required, etc.) on how to have the 16380C calibrated, contact the nearest Agilent Sales and Service Office.

Recommended Calibration Cycle

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

Repair

The 16380C 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 Agilent Sales and Service Office.