Agilent 42030A Four-Terminal Pair Standard Resistor Set

Operation and Service Manual

Agilent Technologies
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How To Use This Manual. This is the Operation and Service Manual for the 42030A Four-Terminal Pair Standard Resistor Set. This contains operation and service information, and consists of the following two chapters.

Chapter 1 General Information Chapter 1 describes the 42030A description, specification, and, other general information.

Chapter 2 Service Chapter 2 describes the 42030A calibration and repair.

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General Information

Introduction

This chapter provides the 42030A Four-Terminal Pair Standard Resistor Set description, specifications, and related general information.

Description

The 42030A Four-Terminal Pair Standard Resistor Set consists of nine precision resistor standards. The set is constructed using high stability resistors and are virtually unaffected by changes in ambient temperature, ensuring measurement repeatability and reliability. Table 1-1 lists the 42030A contents.

Table 1-1. 42030A Contents

Model No. or Agilent Part No.	Description	Qty.
42031A	1 mΩ Standard Resistor	1
42032A	10 mΩ Standard Resistor	1
42033A	100 mΩ Standard Resistor	1
42034A	1 Ω Standard Resistor	1
42035A	10 Ω Standard Resistor	1
42036A	100 Ω Standard Resistor	1
42037A	1 kΩ Standard Resistor	1
42038A	10 kΩ Standard Resistor	1
42039A	100 kΩ Standard Resistor	1
42030-60100	Carrying Case	1
42030-90001	Operation and Service Manual	1
Not Assigned	Calibration Report	1

The 42030A is designed for use in calibrating the Agilent LCR meters which have four-terminal pair measurement terminals, and can be directly connected to the measurement terminals. The lcr meter documentation will give detailed information on using the 42030A.

Initial Inspection

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

Repackaging for Shipment

Agilent Packing Materials

Containers and materials identical to those used in factory packaging are available from Agilent Technologies. If the instrument is being returned to Agilent Technologies 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.

Non-Agilent Packing Materials

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

a. If shipping to Agilent Technologies 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 the complete specifications for the 42030A Four-Terminal Pair Standard Resistor Set. When the 42030A is shipped from the factory, it meets the specifications listed in this section.

DC Resistance

Table 1-2 lists the nominal DC resistance for each resistance module of the 42030A.

Table 1-2. DC Resistance

Model Number	DC Resistance[1]
42031A	1 mΩ ± 0.2%
42032A	10 mΩ ± 0.2%
42033A	100 mΩ ± 0.2%
42034A	1 Ω ± 0.2%
42035A	10 Ω ± 0.1%
42036A	100 Ω ± 0.1%
42037A	1 kΩ ± 0.1%
42038A	10 kΩ ± 0.1%
42039A	100 kΩ ± 0.1%

1 Specified under ambient environmental conditions of: Temperature 23 °C ± 5 °C , Relative Humidity ≤ 70%

Operating Conditions

The 42030A must be operated under the ambient environmental conditions listed in Table 1-3

Table 1-3. Operating Conditions

Temperature	23 °C ± 5 °C
Relative Humidity	≤ 70%

Dimensions

Table 1-4 shows the 42030A dimensions.

Table 1-4. Dimensions

Resistance Module	94 mm (W) × 31 mm (H) × 67 mm (D)
Carrying Case	400 mm (W) × 120 mm (H) × 290 mm (D)

Weight

Table 1-5 shows the 42030A weight.

Table 1-5. Weight

Resistance Module	170 g (ea.)
42030A Total	3,700 g

Supplemental Performance Characteristics

This section gives the supplemental performance characteristics for the 42030A Four-Terminal Pair Standard Resistor Set . These supplemental performance characteristics are not guaranteed, they are the 42030A typical characteristics that may be expected.

Temperature Coefficient and Stability

Table 1-6 shows the 42030A DC resistance temperature coefficient and stability.

Table 1-6.
DC Resistance Temperature Coefficient and Stability

Model Number	Nominal Value	Temperature Coefficient[1]	Stability[2]
42031A	1 mΩ	± 15 ppm/°C	±100 ppm/year
42032A	10 mΩ	± 15 ppm/°C	±100 ppm/year
42033A	100 mΩ	± 15 ppm/°C	±100 ppm/year
42034A	1 Ω	± 15 ppm/°C	±100 ppm/year
42035A	10 Ω	± 10 ppm/°C	±100 ppm/year
42036A	100 Ω	± 10 ppm/°C	±100 ppm/year
42037A	1 kΩ	± 10 ppm/°C	±100 ppm/year
42038A	10 kΩ	± 10 ppm/°C	±100 ppm/year
42039A	100 kΩ	± 10 ppm/°C	±100 ppm/year

1 Under temperature condition: 23 °C ± 5 °C

2 Under environmental conditions: Temperature 23 °C ± 5 °C , Relative Humidity ≤ 70%

Storage Conditions

The 42030A must be stored or shipped under the ambient environmental conditions listed in Table 1-7.

Table 1-7. Storage Conditions

Temperature	– 40 °C to + 70 °C
Relative Humidity	≤ 95% at 40 °C

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Calibration and Repair

Introduction

This chapter provides the calibration and repair information for the 42030A Four-Terminal Pair Standard Resistor Set .

Calibration

The 42030A is calibrated in the parameters given in Table 2-1 with the calibration uncertainties given in Table 2-2 through Table 2-7 and equipped with a calibration report, when shipped from the factory.

Table 2-1. 42030A Calibration Parameters

Model Number	Nominal Value	DC Resistance	Series Resistance and Reactance	Parallel Resistance and Susceptance
42031A	1 mΩ	√		
42032A	10 mΩ	√		
42033A	100 mΩ	√		
42034A	1 Ω	√		
42035A	10 Ω	√	√	
42036A	100 Ω	√	√	
42037A	1 kΩ	√		√
42038A	10 kΩ	√		√
42039A	100 kΩ	√		√

Table 2-2.
42030A DC Resistance Calibration Uncertainty

Model Number	Nominal Value	Calibration Uncertainty
42031A	1 mΩ	± 0.1%
42032A	10 mΩ	± 0.1%
42033A	100 mΩ	± 0.1%
42034A	1 Ω	± 0.1%
42035A	10 Ω	± 0.03%
42036A	100 Ω	± 0.02%
42037A	1 kΩ	± 0.02%
42038A	10 kΩ	± 0.02%
42039A	100 kΩ	± 0.02%

Table 2-3.
42035A 10 Ω Resistor AC Calibration Uncertainty

Frequency	Calibration Uncertainty	
	Series Resistance	Reactance
1 MHz	±0.12%	±0.010 Ω
2 MHz	±0.15%	±0.010 Ω
3 MHz	±0.20%	±0.015 Ω
4 MHz	±0.25%	±0.025 Ω
5 MHz	±0.4%	±0.03 Ω
10 MHz	±1.0%	±0.08 Ω
13 MHz	±1.5%	±0.10 Ω

Table 2-4.
42036A 100 Ω Resistor AC Calibration Uncertainty

Frequency	Calibration Uncertainty	
	Series Resistance	Reactance
1 MHz	±0.12%	±0.10 Ω
2 MHz	±0.12%	±0.10 Ω
3 MHz	±0.15%	±0.15 Ω
4 MHz	±0.15%	±0.15 Ω
5 MHz	±0.20%	±0.20 Ω
10 MHz	±0.5%	±0.5 Ω
13 MHz	±0.7%	±0.7 Ω

Table 2-5.
42037A 1 kΩ Resistor AC Calibration Uncertainty

Frequency	Calibration Uncertainty	
	Parallel Resistance	Susceptance
100 kHz	±0.12%	±0.8 μS
1 MHz	±0.08%	±1.0 μS
2 MHz	±0.10%	±1.0 μS
3 MHz	±0.10%	±1.5 μS
4 MHz	±0.15%	±2.0 μS
5 MHz	±0.15%	±3.0 μS
10 MHz	±0.4%	±5 μS
13 MHz	±0.6%	±8 μS

Table 2-6.
42038A 10 kΩ Resistor AC Calibration Uncertainty

Frequency	Calibration Uncertainty	
	Parallel Resistance	Susceptance
100 kHz	±0.08%	±0.10 μS
1 MHz	±0.08%	±0.20 μS

Table 2-7.
42039A 100 kΩ Resistor AC Calibration Uncertainty

Frequency	Calibration Uncertainty	
	Parallel Resistance	Susceptance
100 kHz	±0.08%	±0.02 μS
1 MHz	±0.12%	±0.15 μS

The 42030A must be calibrated at a facility which satisfies the calibration uncertainties given in Table 2-2 through Table 2-7. Agilent Technologies's calibration laboratories satisfy all of these calibration uncertainties. For complete information on calibration, contact your nearest Agilent Technologies sales and service office.

Calibration Interval

The 42030A's recommended calibration interval is one year.

Repair

The 42030A can be repaired only at Agilent Technologies facilities. For complete information on repair, contact your nearest Agilent Technologies Sales and Service Office.