

## General Information

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### Introduction

The purpose of this manual is to enable you to use your 16314A, 16315A, 16316A and 16317A efficiently and confidently. This manual contains both general and specific information. To find specific information without reading the entire manual, see the "Using the 16314A/5A/6A/7A" paragraph.

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### Using the 16314A/5A/6A/7A

The 16314A/5A/6A/7A has been designed to operate with Agilent Technologies 4-terminal-pair impedance analyzers or network analyzers.

- To install the 16314A/5A/6A/7A, see Chapter 2.
- To operate the 16314A/5A/6A/7A, see Chapter 3 and Chapter 4.
- To order replaceable parts for the 16314A/5A/6A/7A, see Chapter 5.

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### Product Description

The 16314A has been designed to operate with impedance analyzers. The 16315A, 16316A and 16317A have been designed to operate with network analyzers. All are used to measure a balanced device using an unbalanced measurement instrument. Each product has the following features:

16314A :

- Unbalanced 4-terminal-pair to balanced binding posts configuration.
- 100 Hz to 10 MHz Frequency Coverage.
- 50 $\Omega$  load resistor and shorting plate furnished.

16315A, 16316A and 16317A :

- Unbalanced BNC to balanced binding posts configuration.
- Various characteristic impedances (50 $\Omega$  for the 16315A, 100 $\Omega$  for the 16316A, 600 $\Omega$  for the 16317A).
- 100 Hz to 10 MHz Frequency Coverage for the 16315A/6A and 100 Hz to 3 MHz Frequency Coverage for the 16317A
- Load resistor and shorting plate furnished.

## Accessories Supplied

The accessories listed in Table 1-1 through Table 1-4 are supplied with each product:

**Table 1-1. The 16314A Furnished Accessories**

Description	Part Number	Quantity
50 $\Omega$ Load Resistor	P/N 16315-60002	1
Shorting Plate	P/N 16315-60003	1
Operation and Service Manual	P/N 16315-90001	1

**Table 1-2. The 16315A Furnished Accessories**

Description	Part Number	Quantity
50 $\Omega$ Load Resistor	P/N 16315-60002	1
Shorting Plate	P/N 16315-60003	1
Operation and Service Manual	P/N 16315-90001	1

**Table 1-3. The 16316A Furnished Accessories**

Description	Part Number	Quantity
100 $\Omega$ Load Resistor	P/N 16316-60002	1
Shorting Plate	P/N 16315-60003	1
Operation and Service Manual	P/N 16315-90001	1

**Table 1-4. The 16317A Furnished Accessories**

Description	Part Number	Quantity
600 $\Omega$ Load Resistor	P/N 16317-60002	1
Shorting Plate	P/N 16315-60003	1
Operation and Service Manual	P/N 16315-90001	1

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## Specifications

This section lists the complete 16314A/5A/6A/7A specifications. These specifications are the performance standards and limits against which the 16314A/5A/6A/7A is tested. When shipped from the factory, the 16314A/5A/6A/7A meets the following listed specifications:

### Common Specifications for the 16314A/5A/6A/7A

Maximum AC Input Level .....	0.5 V
Maximum DC Input Level .....	0 V
Operating Temperature .....	0 to 55 °C
Operating Humidity .....	≤95% RH (at 40°C)
Non-operating Temperature .....	-40 to 70 °C
Non-operating Humidity .....	≤90% RH (at 65°C)

### Specifications for the 16314A

Terminal Configuration	
UNBAL(Unbalanced) side .....	4 BNC Terminals (4-Terminal-Pair configuration)
BAL(Balanced) side .....	3 Binding Posts(2 signal and 1 ground terminals)
Nominal Characteristic Impedance	
UNBAL(Unbalanced) side .....	50Ω
BAL(Balanced) side .....	50Ω
Terminal Spacing of BAL side .....	14 mm (between 2 signal terminals)
Dimensions .....	89 (W) × 56 (H) × 133 (D) [mm]
Weight .....	400 g

### Specifications for the 16315A

Terminal Configuration	
UNBAL(Unbalanced) side .....	1 BNC Terminal
BAL(Balanced) side .....	3 Binding Posts(2 signal and 1 ground terminals)
Nominal Characteristic Impedance	
UNBAL(Unbalanced) side .....	50Ω
BAL(Balanced) side .....	50Ω
Terminal Spacing of BAL side .....	14 mm (between 2 signal terminals)
Dimensions .....	89 (W) × 55 (H) × 121 (D) [mm]
Weight .....	350 g

### Specifications for the 16316A

Terminal Configuration	
UNBAL(Unbalanced) side .....	1 BNC Terminal
BAL(Balanced) side .....	3 Binding Posts(2 signal and 1 ground terminals)
Nominal Characteristic Impedance	
UNBAL(Unbalanced) side .....	50Ω
BAL(Balanced) side .....	100Ω
Terminal Spacing of BAL side .....	14 mm (between 2 signal terminals)
Dimensions .....	89 (W) × 55 (H) × 121 (D) [mm]
Weight .....	350 g

## Specifications for the 16317A

Terminal Configuration	
UNBAL(Unbalanced) side	1 BNC Terminal
BAL(Balanced) side	3 Binding Posts(2 signal and 1 ground terminals)
Nominal Characteristic Impedance	
UNBAL(Unbalanced) side	50 $\Omega$
BAL(Balanced) side	600 $\Omega$
Terminal Spacing of BAL side	14 mm (between 2 signal terminals)
Dimensions	89 (W) $\times$ 55 (H) $\times$ 121 (D) [mm]
Weight	350 g

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## Typical Characteristics

This section lists typical characteristics. Typical characteristics are not specifications, but do provide additional information for the operator. Typical characteristics are not guaranteed.

### Typical Characteristics for the 16314A

Frequency Range	100 Hz to 10 MHz
Insertion Loss (at 23 $\pm$ 5 $^{\circ}$ C,100kHz)	$\leq$ 1.0 dB
Frequency Response (at 23 $\pm$ 5 $^{\circ}$ C,100kHz)	$\leq$ $\pm$ 1.0 dB
Return Loss (at 23 $\pm$ 5 $^{\circ}$ C)	
100 Hz $\leq$ Freq. < 300 Hz	$\geq$ 10 dB
300 Hz $\leq$ Freq. $\leq$ 7 MHz	$\geq$ 20 dB
7 MHz < Freq. $\leq$ 10 MHz	$\geq$ 17 dB
Common Mode Loss (at 23 $\pm$ 5 $^{\circ}$ C)	
100 Hz $\leq$ Freq. $\leq$ 3 MHz	$\geq$ 50 dB
3 MHz < Freq. $\leq$ 5 MHz	$\geq$ 45 dB
5 MHz < Freq. $\leq$ 10 MHz	$\geq$ 40 dB

### Typical Characteristics for the 16315A

Frequency Range	100 Hz to 10 MHz
Insertion Loss (at 23 $\pm$ 5 $^{\circ}$ C,100kHz)	$\leq$ 1.0 dB
Frequency Response (at 23 $\pm$ 5 $^{\circ}$ C,100kHz)	$\leq$ $\pm$ 1.0 dB
Return Loss (at 23 $\pm$ 5 $^{\circ}$ C)	
100 Hz $\leq$ Freq. < 300 Hz	$\geq$ 10 dB
300 Hz $\leq$ Freq. $\leq$ 7 MHz	$\geq$ 20 dB
7 MHz < Freq. $\leq$ 10 MHz	$\geq$ 17 dB
Common Mode Loss (at 23 $\pm$ 5 $^{\circ}$ C)	
100 Hz $\leq$ Freq. $\leq$ 3 MHz	$\geq$ 50 dB
3 MHz < Freq. $\leq$ 5 MHz	$\geq$ 45 dB
5 MHz < Freq. $\leq$ 10 MHz	$\geq$ 40 dB

### Typical Characteristics for the 16316A

Frequency Range .....	100 Hz to 10 MHz
Insertion Loss (at 23±5°C, 100kHz) .....	≤1.0 dB
Frequency Response (at 23±5°C, 100kHz) .....	≤±1.0 dB
Return Loss (at 23±5°C)	
100 Hz ≤ Freq. < 300 Hz .....	≥10 dB
300 Hz ≤ Freq. ≤ 7 MHz .....	≥20 dB
7 MHz < Freq. ≤ 10 MHz .....	≥17 dB
Common Mode Loss (at 23±5°C)	
100 Hz ≤ Freq. ≤ 3 MHz .....	≥50 dB
3 MHz < Freq. ≤ 5 MHz .....	≥45 dB
5 MHz < Freq. ≤ 10 MHz .....	≥40 dB

### Typical Characteristics for the 16317A

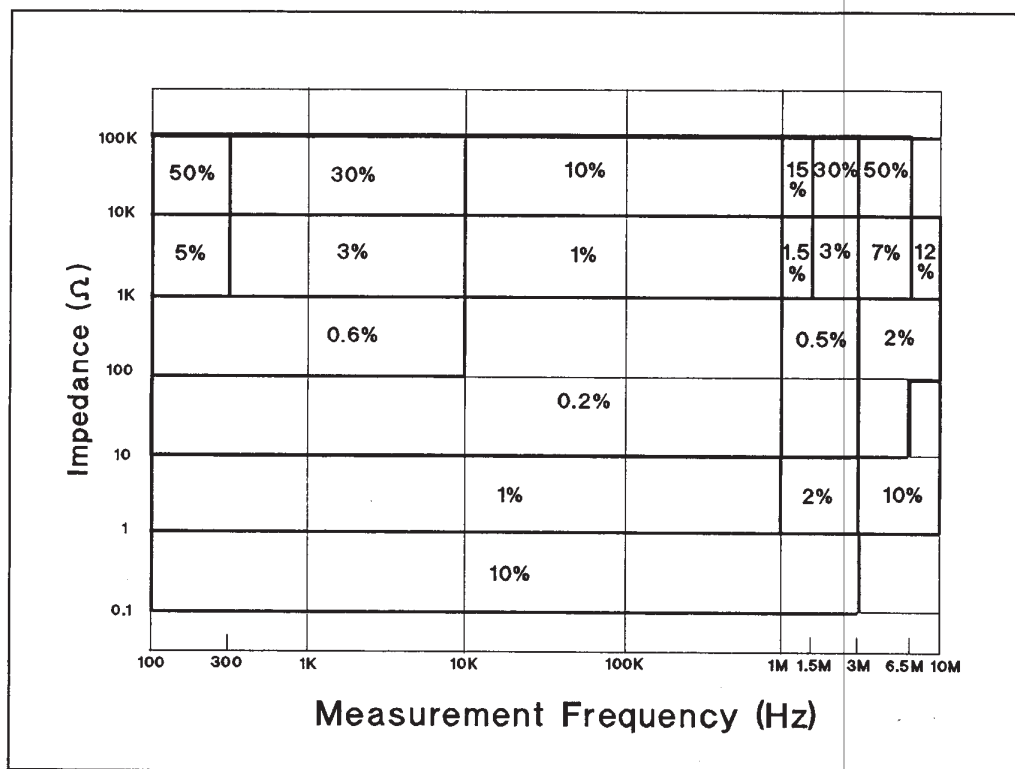
Frequency Range .....	100 Hz to 3 MHz
Insertion Loss (at 23±5°C, 100 kHz) .....	≤1.0 dB
Frequency Response (at 23±5°C, 100 kHz) .....	≤±1.5 dB
Return Loss (at 23±5°C)	
100 Hz ≤ Freq. < 300 Hz .....	≥10 dB
300 Hz ≤ Freq. ≤ 1 MHz .....	≥20 dB
1 MHz < Freq. ≤ 3 MHz .....	≥15 dB
Common Mode Loss (at 23±5°C)	
100 Hz ≤ Freq. ≤ 1 MHz .....	≥50 dB
1 MHz < Freq. ≤ 3 MHz .....	≥45 dB

### Typical Characteristics for 50Ω/100Ω/600Ω Load Resistors

DC R .....	±0.1 %
Parallel Capacitance .....	≤3 pF
Series Inductance .....	≤200 nH

### Additional Impedance Measurement Error (Typical Data) When Using the 16314A

Figure 1-1 shows the additional impedance measurement error of the 16314A. The actual measurement accuracy can be approximately calculated by adding the 16314A's additional impedance measurement error to the impedance analyzer's measurement accuracy.



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**Figure 1-1. 16314A Additional Impedance Measurement Error (Typical Data)**

This measurement error is obtained under the following conditions:

1. Measurement Instruments : 4194A and 16314A
2. Compensation :  $0\Omega/0S/50\Omega$  correction at the BAL terminal of the 16314A.
3. DUT : Fixed resistor
4. The neutral point of converter (16314A) is not grounded.
5. 4194A's setting :
  - a. Integ Time MED
  - b. Averaging 4
  - c. Osc Level 0.5 V
6. Temperature :  $23\pm 5^{\circ}\text{C}$

**Note** The DUT's unbalanced factor influences the impedance measurement accuracy.

