
Manual Change

This manual change describes the procedure when use the Agilent 16353A/16353H Standard Resistor Set instead of the Agilent 16340A RC-Box in 4339B Performance Test. When use the Agilent 16340A RC-Box, refer to the Chapter 9 (Maintenance) in this manual.

Test Equipment

Table 1 lists the recommended equipment for performing 4339B maintenance.

Table 1

Required Equipment

Equipment	Requirements	Recommended Model	Qty.	Use *1
DC Voltmeter	Voltage Range: 0V to 1000V Accuracy: <0.04%	3458A	1	P
Standard Resistor Set	No substitute	16353A/16353H	1	P, F
10 kΩ Resistor		42038A	1	P
RC Box Adapter	No substitute	PN 04339-65005	1	P, F
V Measurement Adapter	No substitute	PN 04339-65006	1	P
BNC(F)-TXA Ground Open (F) Adapter			1	P
BNC(F)-(F) Adapter		PN 1250-1830	1	P
Cable	Banana-Banana Jumper	11058A	1	P
Cable	Dual Banana-BNC(m) Cable	PN 11001-60001	1	P
Handler Interface Tester	No Substitute	PN 04339-65007	1	F

*1.P: Performance Tests, F: Functional Tests

Performance Tests

Introduction

This section provides the test procedures used to verify that the 4339B's specifications listed in Chapter 8, General Information, of this manual are met. All tests can be performed without access to the interior of the instrument. The performance tests can also be used to perform incoming inspection, and to verify that the 4339B meets its performance specifications after troubleshooting or adjustment. If the performance tests indicate that the 4339B is NOT operating within the specified limits, check your test setup, then proceed with troubleshooting if necessary.

NOTE Allow the 4339B to warm up for at least 30minutes before you execute any of the performance tests.

NOTE Perform all performance tests in ambient conditions of $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$, $\leq 70\%$ RH.

Test Equipment

Table 1 lists the test equipment required to perform the tests described in this section. Use only calibrated test instruments when performance testing the 4339B4. Equipment which equals or surpasses the key required specifications of the recommended equipment may be used as a substitute.

Calculation Sheet

The calculation sheet is used as an aid for recording raw measurement data, and for calculating the performance test results.

The performance test procedure gives the test sequence for performing a test. The complete set of measurement data is recorded on the calculation sheet. The results are calculated using the equations given on the calculation sheet, and the result are transcribed to the performance test record.

The procedure for using the calculation sheet is:

1. Photocopy the calculation sheet.
 2. Follow the performance test procedure and record the measurement value(s), the 4339B's reading, etc., into the specified column on the calculation sheet.
 3. Calculate the test result using the appropriate equation given on the calculation sheet, and record the test result into the Test Result column of the performance test record.
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Performance Test Record

Record the performance test results in the test record at the end of this chapter (Photocopy the test record and use the photocopy). The test record lists all test specifications, their acceptable limits, and measurement uncertainties for the recommended test equipment. Test results recorded during incoming inspection can be used for comparison purposes during periodic maintenance, troubleshooting, and after repair or adjustment.

Calibration Cycle

The 4339B requires periodic performance tests. The frequency of performance testing depends on the operating and environmental conditions under which the 4339B is used. Verify the 4339B's performance at least once a year, using the performance tests described in this section.

Source Voltage Accuracy Test

The 4339B's source voltage is measured with a DC voltmeter.

Specification

Source Voltage (Vs) Accuracy: $\pm (0.16 \% + 100\text{mV}) (Vs \leq 200\text{V})$
 $\pm (0.16 \% + 500\text{mV}) (Vs > 200\text{V})$

Test Equipment

Description	Recommended Model
Multimeter	3458A
V Measurement Adapter	PN 04339-65006
Banana-Banana Jumper	11508A

Procedure

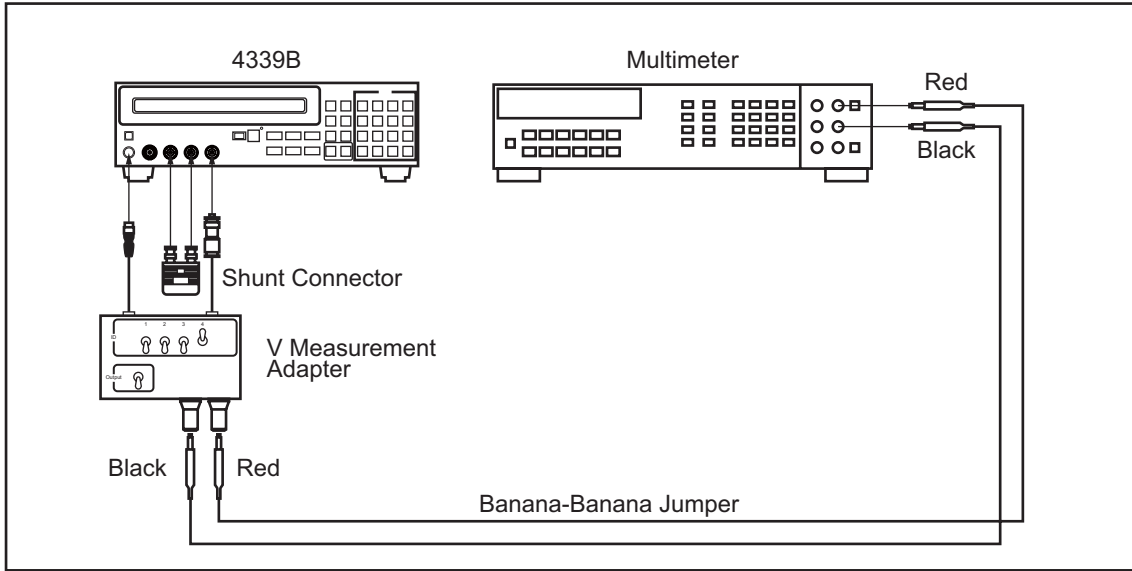
WARNING

When the High Voltage indicator is lit, the 4339B outputs high voltages of up to 1000 Vdc maximum.

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- Step 1.** Reset the 4339B using the following procedure:
1. Press [blue][.] to display the system reset menu.
 2. Select Yes using [←][↓] or [↑][→] and press [Enter].
- Step 2.** Set up the equipment as shown in Figure 1.
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Manual Change
Source Voltage Accuracy Test

Figure 1 Source Voltage Accuracy Test Setup



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Step 3. Press the 3458A Multimeter's [DCV] to set the measurement mode to DC voltage.

Step 4. Set the V Measurement Adapter's ID switches and Output switch as follows:

Switch	Setting
ID1	0
ID2	0
ID3	0
ID4	1
Output	Enable

Step 5. On the 4339B, press [V Output] to turn the source voltage ON. (V Output indicator turns ON.)

Step 6. Record the multimeter reading on the calculation sheet. (Initial output voltage setting is 0 V.)

Step 7. Press [V Output] to turn the source voltage OFF. (V Output indicator turns OFF.)

Step 8. Calculate the test result according to the calculation sheet, and record the result into the performance test record.

Step 9. Perform this test for all the voltage settings listed in Table 2. The source voltage must be turned OFF after each test. The source voltage can be changed using the following procedure :

1. Press [Source Voltage] to display the source voltage setup menu.
2. Use the numeric keys to enter a desired voltage, and press [Enter].

3. The desired voltage will be displayed.

Table 2 **Source Voltage Accuracy Test Settings**

Source Voltage Setting
0V
10V
25V
50V
100V
200V
201V
250V
500V
1000V

Ammeter Offset Voltage and Input Resistance Test

The 4339B's ammeter offset voltage and input resistance are measured.

Specification

Ammeter Offset Voltage:	$\leq 0.5\text{mV}$
Ammeter Input Resistance:	$1\text{ k}\Omega \pm 5\%$

Test Equipment

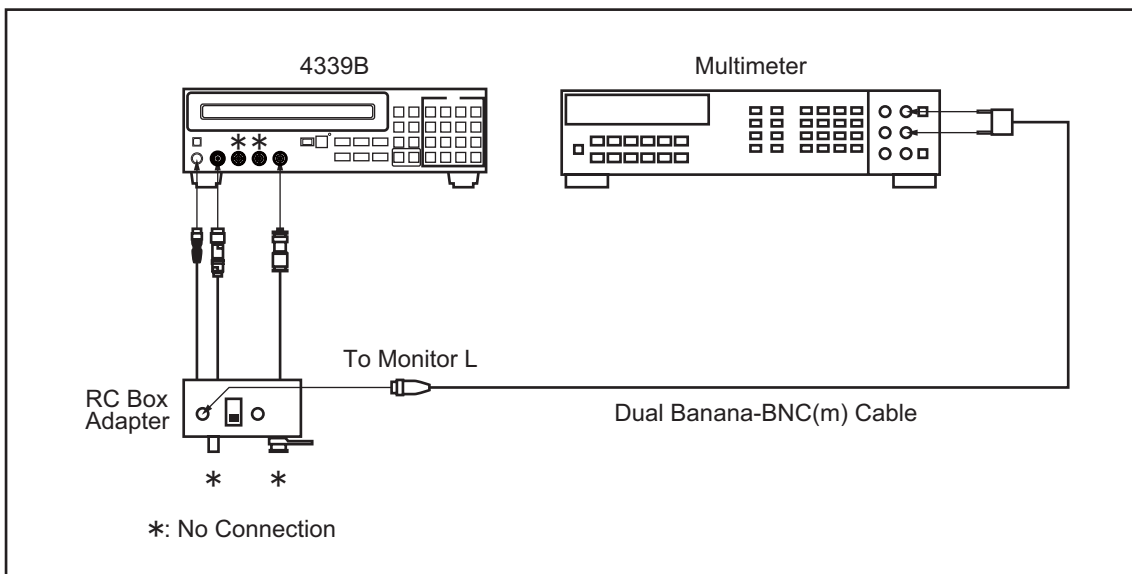
Description	Recommended Model
Multimeter	3458A
RC Box Adapter	PN 04339-65005
Dual Banana-BNC(m) Cable	PN 11001-60001
42038A 10 k Ω Resistor	42038A

Procedure

Ammeter Offset Voltage Test.

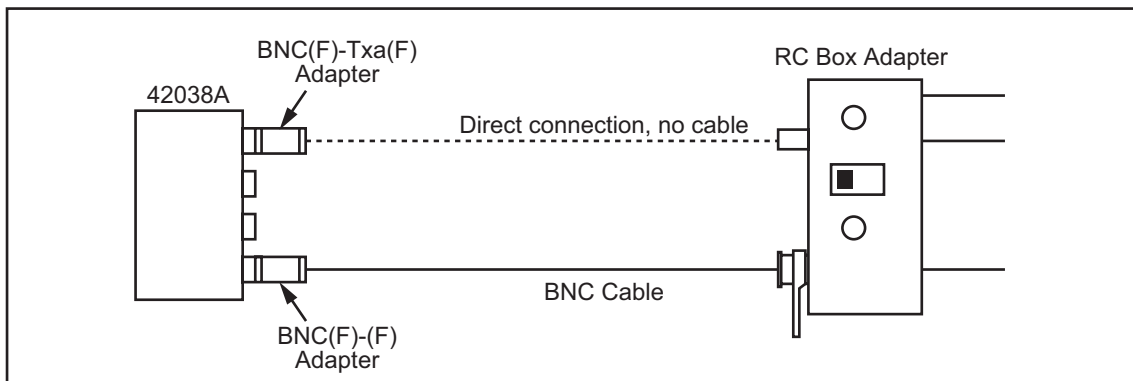
- Step 1.** Reset the 4339B using the following procedure:
1. Press [blue][.] to display the system reset menu.
 2. Select Yes using [←][↓] or [↑][→] and press [Enter].
- Step 2.** Set up the equipment as shown in Figure 2.

Figure 2 Ammeter Offset Voltage Test Setup



- Step 3.** Set the RC Box Adapter switch to the *F* position.
- Step 4.** Press the 3458A Multimeter's [DCV] to set the measurement mode to DC voltage.
- Step 5.** Press the 4339B's [Meas time] to set the measurement time to SHORT. The current measurement time setting is indicated by the **Meas Time** annunciator.
- Step 6.** Set the measurement range to 100 μ A using the following procedure:
1. Press [blue][Auto Hold] to display the measurement range setup menu.
 2. Press [\uparrow][\rightarrow] until 100 μ A appears, and press [Enter].
- Step 7.** Press [Trig Mode] to set the trigger mode to Manual. The current trigger mode setting is indicated by the **Trigger** annunciator.
- Step 8.** Record the multimeter reading into the performance test record. Do not change the equipment setup for the following ammeter input resistance test.
- Ammeter Input Resistance test.**
- Step 9.** Record the 42038A 10 k Ω calibration value and the ammeter offset voltage test result on the calculation sheet.
- Step 10.** Connect the 42038A to the RC Box Adapter as shown in Figure 3.

Figure 3 42038A Connection



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- Step 11.** Set the source voltage to 1V using the following procedure:
1. Press [Source Voltage] to display the source voltage setup menu.
 2. Press [1][Enter] to set the source voltage to 1V.
 3. Confirm that +1V is displayed on the right side of the LCD.
- Step 12.** Press [V Output] to turn the source voltage ON. (V Output indicator turns ON.)
- Step 13.** Record the multimeter reading on the calculation sheet on the L Voltage line.
- Step 14.** Disconnect the Dual Banana-BNC(m) cable from the Monitor L terminal and connect it to the Monitor H terminal.
- Step 15.** Record the multimeter reading on the calculation sheet on the H Voltage line.
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Manual Change
Source Voltage Accuracy Test

Step 16. Calculate the test result according to the calculation sheet, and record the result into the performance test record.

Current Measurement Accuracy Test

The 4339B measures the current through the calibrated 16353A/16353H , and the measured values are compared with the current values calculated from the 16353A/16353H's calibration value and the voltage across the standard.

Specification

Basic Measurement Accuracy: $\pm 0.4\%$ (See Chapter 8 General Information for details.)

Test Equipment

Description	Recommended Model
Multimeter	3458A
Standard Resistor Set	16353A, 16353H
RC Box Adapter	PN 04339-65005
Dual Banana-BNC(m) Cable	PN 11001-60001

Procedure

Step 1. Record the 16353A/16353H Standard Resistor Set calibration values on the calculation sheet.

Step 2. Reset the 4339B using the following procedure:

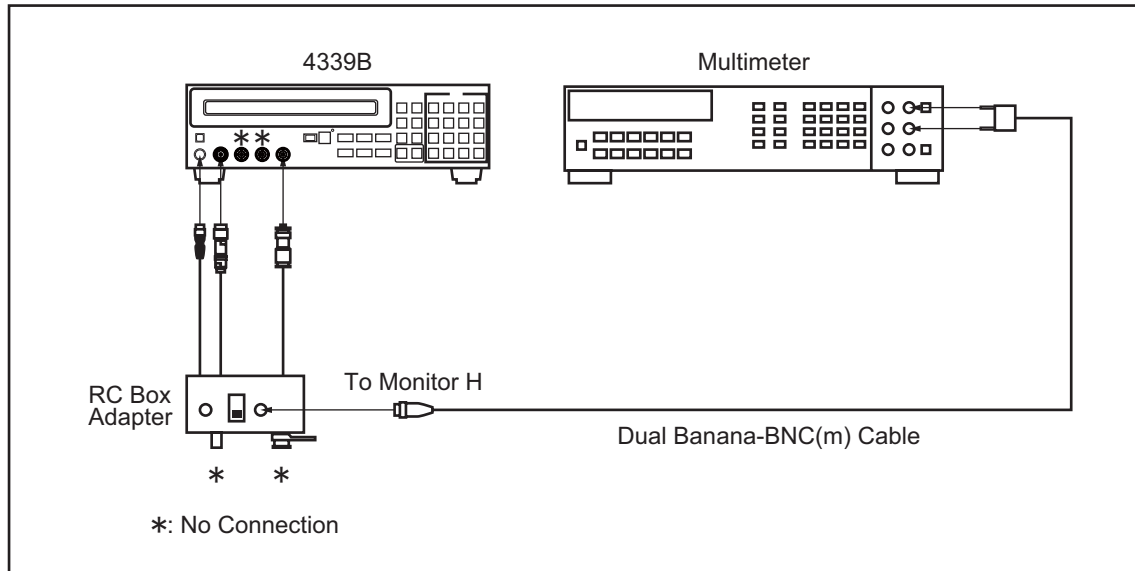
1. Press [blue] [·] to display the system reset menu.
2. Select Yes using [←][↓] or [↑][→] and press [Enter].

Step 3. Set the Offset-error Canceling to ON using the following procedure:

1. Press [blue][-] to display the configuration setting menu.
2. Select Offset using [←][↓] or [↑][→] and press [Enter].
3. Select On using [←][↓] or [↑][→] and press [Enter].
4. Select Exit and press [Enter] to exit the configuration setting menu.

Step 4. Set up the equipment as shown in Figure 4.

Figure 4 Current Measurement Accuracy Test Setup

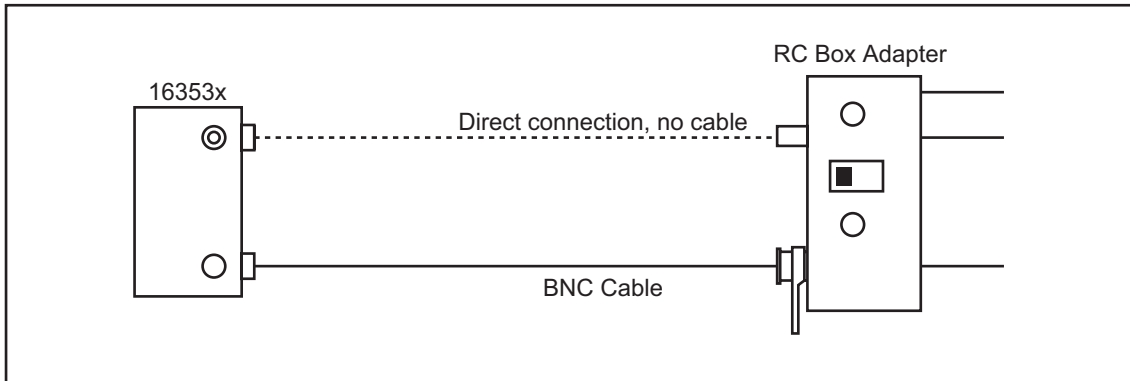


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- Step 5.** Set the RC Box Adapter switch to the *F* position.
- Step 6.** Press the 3458A Multimeter's [DCV] to set the measurement mode to DC voltage.
- Step 7.** Press [blue] [5]. Select **ExecCal** and press [Enter] to perform the calibration.
- Step 8.** Set the source voltage to 10V using the following procedure:
1. Press [Source Voltage] to display the source voltage setup menu.
 2. Press [1][0][Enter] to set the source voltage to 10V.
 3. Confirm that +10V is displayed on the right side of the LCD.
- Step 9.** Press [V Output] to turn the source voltage ON. (V Output indicator turns ON.)
- Step 10.** Press [blue] [4]. Select **OpenMeas** and press [Enter] to perform the OPEN correction.
- Step 11.** Press [V Output] to turn the source voltage OFF. (V Output indicator turns OFF.)
- Step 12.** Connect the 16353B to the RC Box Adapter as shown in Figure 5.

Manual Change
Source Voltage Accuracy Test

Figure 5 16353x Connection



- Step 13.** Press [MeasPrmtr]. Select I and press [Enter] to set the measurement parameter to current (I).
- Step 14.** Press [MeasTime] to set the measurement time to LONG. The current measurement time setting is indicated by the **Meas Time** annunciator.
- Step 15.** Press [Trig Mode] to set the trigger mode to **Manual**. The current trigger mode setting is indicated by the **Trigger** annunciator.
- Step 16.** Set the source voltage to 1V using the following procedure:
1. Press [Source Voltage] to display the source voltage setup menu.
 2. Press [1][Enter] to set the source voltage to 1V.
 3. Confirm that +1V is displayed on the right side of the LCD.
- Step 17.** Press [V Output] to turn the source voltage ON. (V Output indicator turns ON.)
- Step 18.** Press [Trig] to measure.
- Step 19.** Record the multimeter reading on the calculation sheet on the Multimeter Reading line.
- Step 20.** Record the 4339B reading on the calculation sheet on the 4339B Reading line.
- Step 21.** Press [V Output] to turn the source voltage OFF. (V Output indicator turns OFF.)
- Step 22.** Calculate the test result according to the calculation sheet, and record the result into the performance test record.
- Step 23.** Perform this test for all settings listed in Table 3. The source voltage must be turned OFF after each test.
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Table 3 **Current Measurement Accuracy Test Settings**

Test Current	Standard Resistor	Voltage Setting	Measurement Time
100pA	16353G	1V	LONG
1nA	16353F	1V	LONG
10nA	16353E	1V	LONG
100nA	16353D	1V	LONG
1μA	16353C	1V	LONG
10μA	16353B	1V	LONG
100μA	16353B	10V	SHORT

Resistance Measurement Accuracy Test

The 4339B measures the resistance values of the calibrated 16353A/16353H, and these measurements are compared with the 16353A/16353H's calibration value.

Specification

Basic Measurement Accuracy: $\pm 0.6\%$ (See Chapter 8 General Information for details.)

Test Equipment

Description	Recommended model
Standard Resistor Set	16353A, 16353H
RC Box Adapter	PN 04339-65005

Procedure

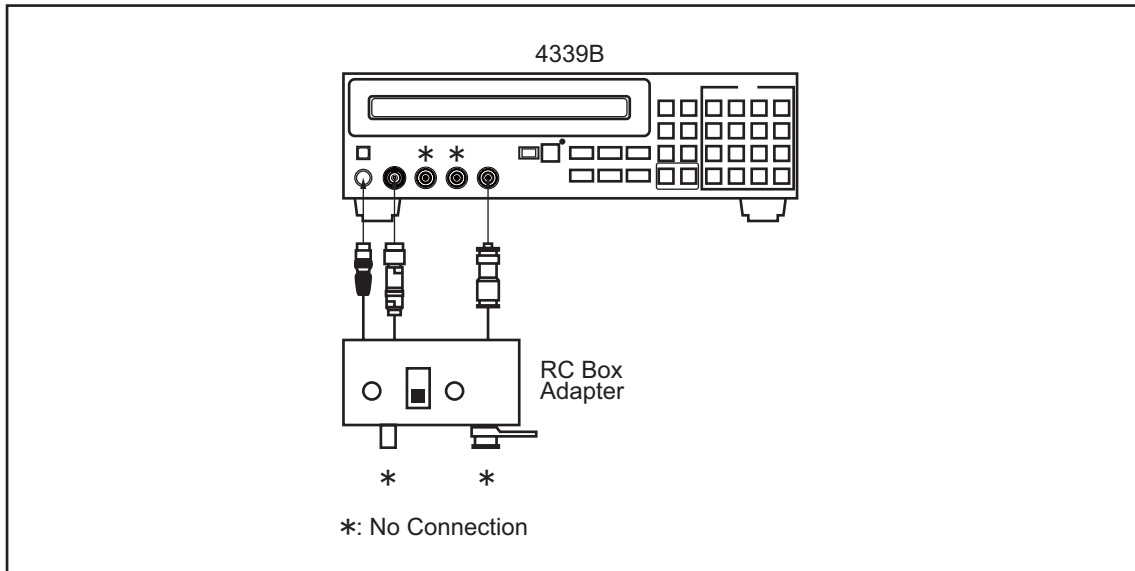
WARNING

When the High VOLTage indicator is lit, the 4339B outputs high voltages of up to 1000Vdc maximum.

Resistance Measurement Accuracy test (Floating Device).

- Step 1.** Record the 16353A/16353H Standard Resistor Set calibration values into the Calculation Sheet.
- Step 2.** Reset the 4339B using the following procedure:
1. Press [blue] [·] to display the system reset menu.
 2. Select Yes using [←][↓] or [↑][→] and press [Enter].
- Step 3.** Set the Offset-error Canceling to ON using the following procedure:
1. Press [blue][·] to display the configuration setting menu.
 2. Select Offset using [←][↓] or [↑][→] and press [Enter].
 3. Select On using [←][↓] or [↑][→] and press [Enter].
 4. Select Exit and press [Enter] to exit the configuration setting menu.
- Step 4.** Set up the equipment as shown in Figure 6.
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Figure 6 Resistance Measurement Accuracy Test Setup (Floating)



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Step 5. Set the RC Box Adapter switch to the *F* position.

Step 6. Press [blue][5]. Select **ExecCal** and press [Enter] to perform the calibration.

Step 7. Set the source voltage to 100V using the following procedure:

1. Press [Source Voltage] to display the source voltage setup menu.
2. Press [1] [0] [0] [Enter] to set the source voltage to 100V.
3. Confirm that + 100V is displayed on the right side of the LCD.

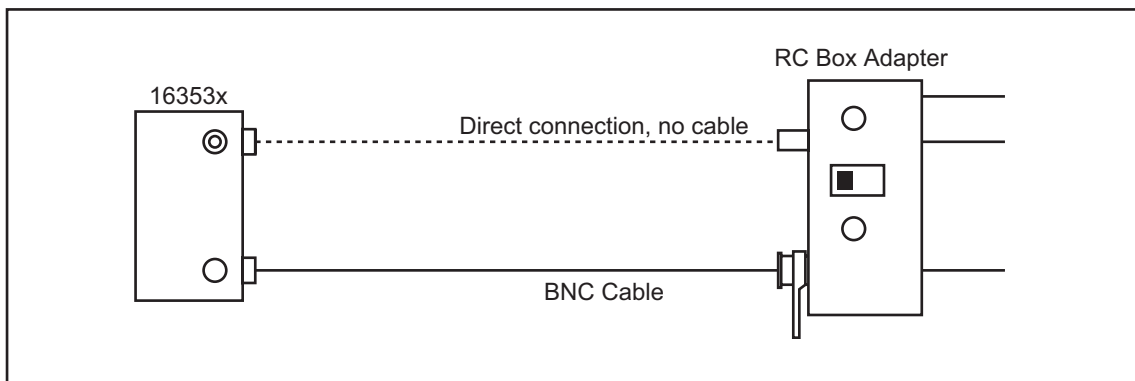
Step 8. Press [V Output] to turn the source voltage ON.(V Output indicator turns ON.)

Step 9. Press [blue] [4]. Select **OpenMeas** and press [Enter] to perform the OPEN correction.

Step 10. Press [V Output] to turn the source voltage OFF.(V Output indicator turns OFF.)

Step 11. Connect the 16353C to the RC Box Adapter as shown in Figure 7.

Figure 7 16353x Connection (Floating)



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Manual Change
Source Voltage Accuracy Test

- Step 12.** Press [Meas Time] to set the measurement time to SHORT. The current measurement time setting is indicated by the **Meas Time** annunciator.
- Step 13.** Press [Trig Mode] to set the trigger mode to Manual. The current trigger mode setting is indicated by the **Trigger** annunciator.
- Step 14.** Press [V Output] to turn the source voltage ON.(V Output indicator lights.)
- Step 15.** Press [Trig] to measure.
- Step 16.** Record the 4339B reading on the calculation sheet.
- Step 17.** Press [V Output] to turn the source voltage OFF. (V Output indicator turns OFF.)
- Step 18.** Calculate the test result according to the calculation sheet, and record the result into the performance test recored.
- Step 19.** Perform the test for all settings listed in Table 4. The source voltage must be turned OFF after each test.

Table 4

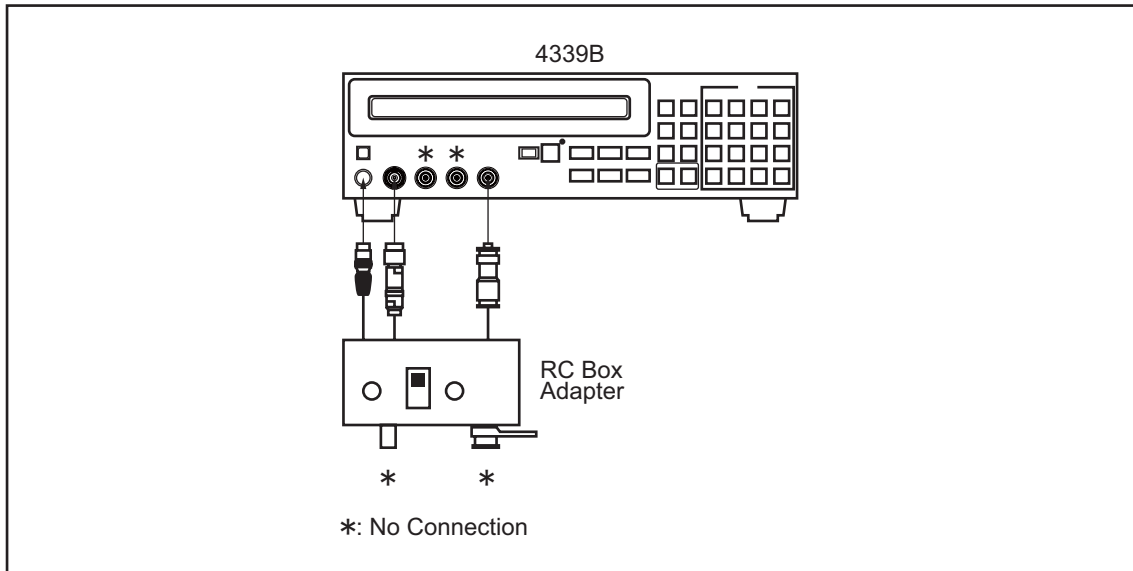
Resistance Measurement Accuracy Test Settings

Standard Resistor	Voltage Setting	Measurement Time
16353C	100V	Short
16353D	100V	Long
16353E	100V	Long
16353F	100V	Long
16353G	100V	Long
16353H	100V	Long
16353H	100V	Short
16353H	10V	Long

Resistance Measurement Accuracy Test (Grounded Device).

- Step 20.** Set up the equipment as shown in Figure 8.
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Figure 8 Resistance Measurement Accuracy Test Setup (Grounded)



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Step 21. Set the RC Box Adapter switch to the *G* position.

Step 22. Set the source voltage to 100V using the following procedure:

1. Press [Source Voltage] to display the source voltage setting.
2. Press [1] [0] [0] [Enter] to set the source voltage to 100V.
3. Confirm that + 100V is displayed on the right side of the LCD.

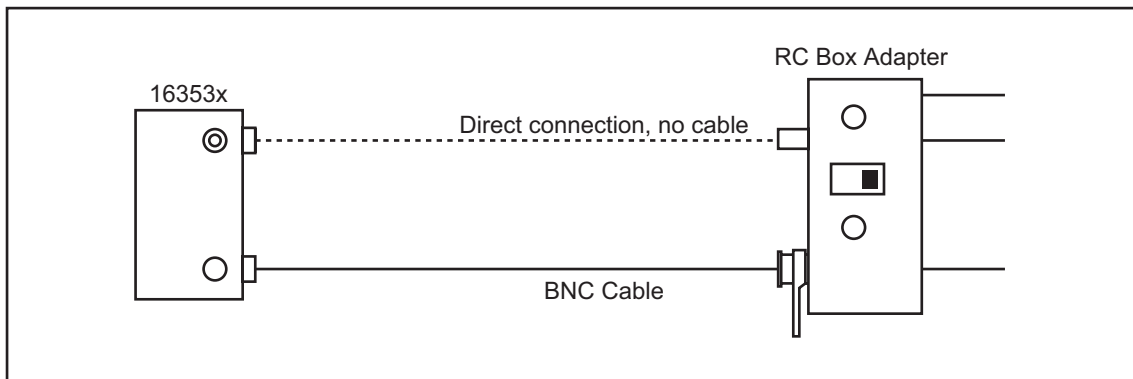
Step 23. Press [V Output] to turn the source voltage ON. (V Output indicator turns ON.)

Step 24. Press [blue] [4]. Select **OpenMeas** and press [Enter] to perform the OPEN correction.

Step 25. Press [V Output] to turn the source voltage OFF. (V Output indicator turns OFF.)

Step 26. Connect the 16353D to the RC Box Adapter as shown in Figure 9.

Figure 9 16353x Connection (Grounded)



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Step 27. Press [V Output] to turn the source voltage ON. (V Output indicator turns ON.)

Manual Change
Source Voltage Accuracy Test

- Step 28.** Press [Trig] to measure.
- Step 29.** Record the 4339B reading on the calculation sheet.
- Step 30.** Press [V Output] to turn the source voltage OFF. (V Output indicator turns OFF.)
- Step 31.** Calculate the test result according to the calculation sheet, and record the result into the performance test record.
- Step 32.** Perform this test for all settings listed in Table 5. The source voltage must be turned OFF after each test.

Table 5

Resistance Measurement Accuracy Test Settings (Grounded)

Standard Resistor	Voltage Setting
16353D	100V
16353H	10V