

HIOKI

Measurement Guide

3159

INSULATION/ WITHSTANDING HiTESTER

HIOKI E. E. CORPORATION

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The Model 3159 Insulation/Withstanding HiTester is a hazardous instrument that generates high voltage. For safe use, please read the “Introduction,” “Inspection,” “Safety Notes,” and “Notes on Use” in the 3159 Instruction Manual.

This document provides, as an example, a simple method for testing withstanding voltage of electrical appliances by using the Model 3159 Insulation/Withstanding HiTester. For details on how to use the 3159, refer to the 3159 Instruction Manual. (Insulation resistance tests can also be performed with the 3159.)

Symbols and Notations Used in this Manual

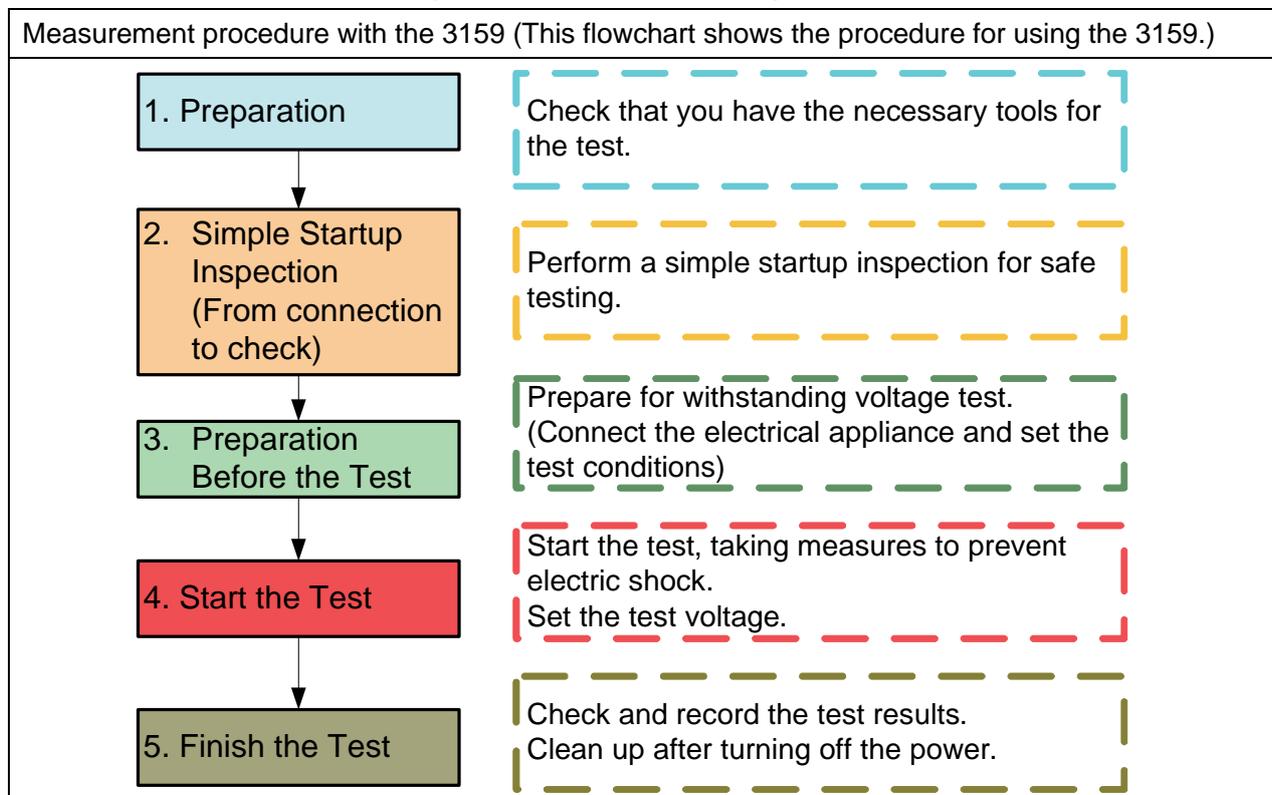
⚠ DANGER... Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death of the user.

⚠ CAUTION... Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument.

⚠ DANGER

The Model 3159 Insulation/Withstanding HiTester is a hazardous instrument that generates high voltage. Please use due caution when handling the 3159. To prevent electric shock, wear high-voltage rubber gloves and electric-proof rubber boots, and put an electric-proof rubber sheet on the work surface.

Please read this manual thoroughly to ensure safe testing.



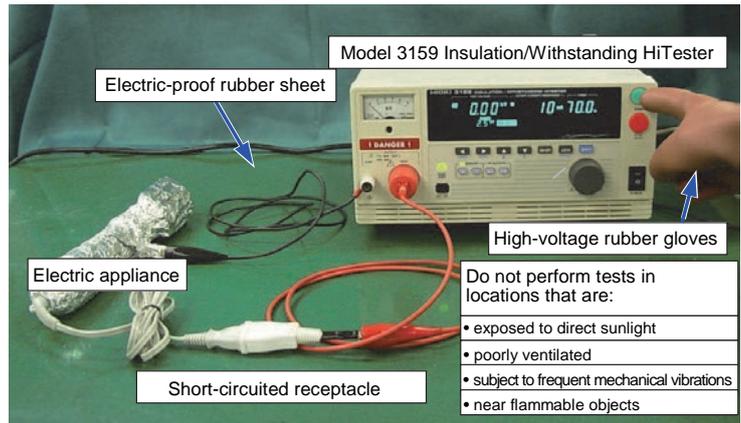
If you accidentally set the wrong settings while checking the operations, turn on the main power switch while holding down the SHIFT key to reset the system (return to initial state).

1. Preparation

(1) Before starting a test using the 3159, check the following information regarding the electrical appliance to be tested.

1. Test voltage
2. Reference leakage current value (upper limit for the test)
3. Test time
4. Test points

Points to connect with test leads
(red, black) of the 3159



(Example test setup)

* This measurement guide explains the procedure based on an example using the following settings.

(Sample settings: Parameters and Values)

Parameter	Test voltage	Reference leakage current value	Test time
Value	1000 V	10 mA	60 seconds

(2) Things to prepare:

1. Model 3159 Insulation/Withstanding HiTester
2. Electrical appliance to be tested
3. Rubber gloves for protection from high voltages (for safe testing)
4. Forms or a computer to record test results
5. Conductive wire (tinned wire or other non-insulated wire)
→ This wire is used to short-circuit the plug pins.

See figure below for details.

Short-circuit the plug pins with the conductive wire by following these steps.

1. Prepare a conductive wire.



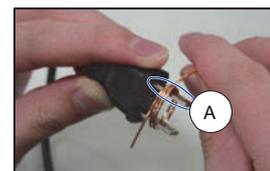
2. Wind the wire tightly around the plug pins as shown in the figure. Wind the wire around the pins 5 or 6 times.

⚠ DANGER Wind the wire tightly to ensure short-circuiting.

⚠ CAUTION Wind the wire being careful not to bend the part of the plug indicated by (A).

3. Check:

Conduct a final check to make sure that the wire is wound tightly around the plug pins.



(Short-circuited plug)

<Example>



* Alternatively, use a receptacle, which is custom-made for the test, with the two leads short-circuited as shown in the "Example test setup" above.

2. Simple Startup Inspection (Connection)

During startup inspection, the operator intentionally applies electric current to check whether the 3159 and the test leads are functioning properly.

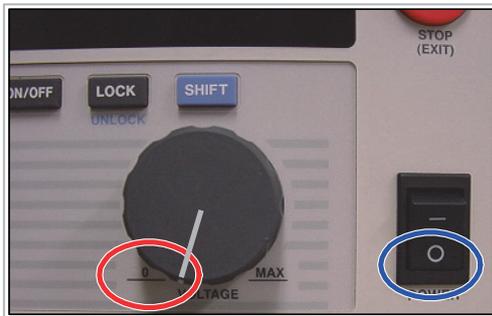
⚠ DANGER

Wear high-voltage rubber gloves when connecting the lead wires.

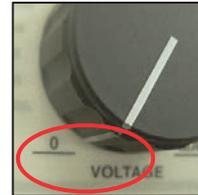
⚠ CAUTION

Connect the test leads securely so that they do not disconnect during the test. Do not place the test leads directly on the ground or floor during the test. Do not bring them into contact with any metal products in the vicinity.

(1)



Check that the **power switch of the 3159 is turned off** and the output voltage knob is in the **zero position**.



(2)



Connect the **power cord** (supplied with the 3159) to the inlet of the main unit and a **grounded outlet**.

⚠ CAUTION

Always properly ground the 3159 in order to prevent electric shocks.

(3)



Tightly attach the supplied **low-voltage test lead** (black) to the **LOW** terminal (black).

Insert the supplied **high-voltage test lead** (red) to the **HIGH** terminal (red) all the way so that it is **firmly seated**.

(4)



Short-circuit the high-voltage test lead (red) and low-voltage test lead (black) as shown in the picture.

Place the connected test leads on a board made of refractory insulated material, such as an electric-proof rubber sheet.

3. Simple Startup Inspection (Settings)

- (1)  Check that **no one is near the testing area**, and turn on the main power switch of the 3159.
- Press the  key and check that the  lamp lights up.
- 

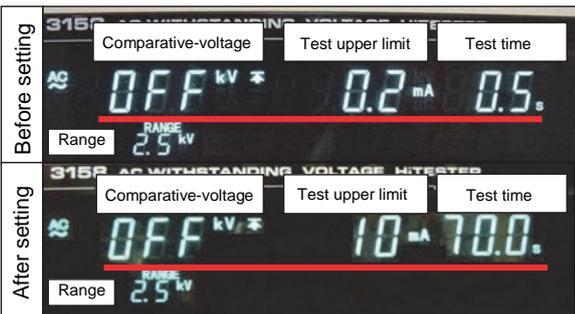
- (2)  Check that the analog voltmeter indicates **0 kV** and that the  lamp does **not light up**.

- (3) Check that  is displayed on the screen.

Take due care when the 3159 enters the READY state in which testing can start.

- (4) Set the parameters as follows:

Parameter	Comparative-voltage	Upper limit for test	Lower limit for test	Test time	Range
Value	OFF	10 mA 	OFF 	70.0 seconds	2.5 kV

- (5)  Use the  and  keys to select range. The selected **item blinks**, which indicates that it can be edited.
- Use the  and  keys to edit **each** (Only the test upper limit and the test time are set here. Leave the comparative-voltage and lower limit set to OFF.)

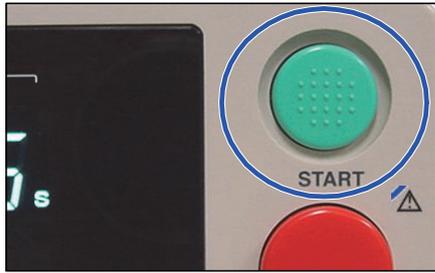
- (6)  Press the STOP (EXIT) key to confirm the test conditions. The 3159 enters the READY state. (The figure on the left shows the 3159 when the test conditions have been confirmed.)

Set the test voltage using the output voltage knob after starting the test.

4. Simple Startup Inspection (Check)

⚠ DANGER Wear high-voltage rubber gloves when connecting the lead wires.

(1)

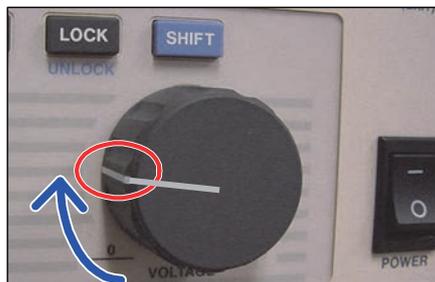


Press the START key to start the test.

⚠ DANGER

When a test is started, high voltage is generated by the 3159 when it enters the **TEST** state.
Do not touch the output voltage HIGH terminal (red) or the test lead while the **! DANGER !** lamp is illuminated.

(2)



Turn the output voltage knob clockwise during the (70 second) test.

During the inspection, you do not need to adjust the voltage accurately. As a general guide, turn the knob about a quarter turn.

(3) Inspection Result

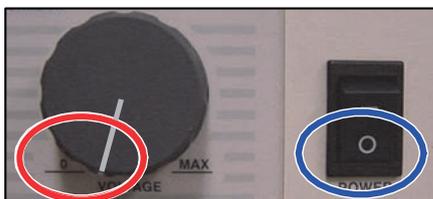
Normal: The 3159 will beep and **UPPER FAIL** will be displayed on the screen.

Abnormal: **PASS** will be displayed on the screen. (Perform steps (4) and (5), then follow the instruction below.)

- * Check the test lead connections (insertion/tightening) and test again. If the result is still "PASS," a test lead may be damaged or the 3159 may be malfunctioning. Please contact your authorized Hioki distributor or reseller.

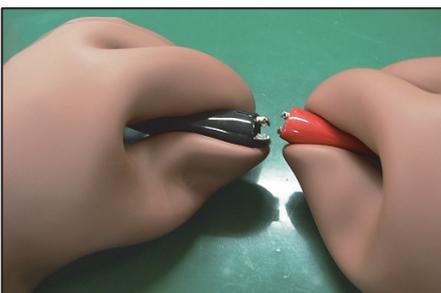
(4) Press the STOP (EXIT) key to cancel the hold state.

(5)



Turn the output voltage knob all the way counter-clockwise, returning it to **zero**. Turn the main power switch of the 3159 off.

(6)



Disconnect the test leads (short-circuited part).

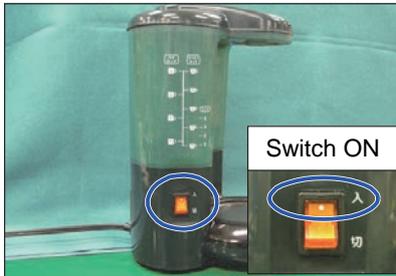
The startup inspection is now complete.

5. Preparation Before the Test

⚠ DANGER Wear high-voltage rubber gloves when connecting the lead wires.

⚠ CAUTION Connect the test leads securely so that they do not disconnect during the test.

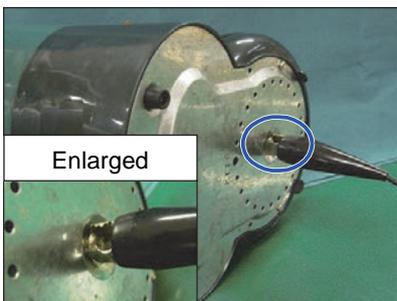
(1)



Turn **on** the power switch of the **electrical appliance while power is not supplied to the electrical appliance.**

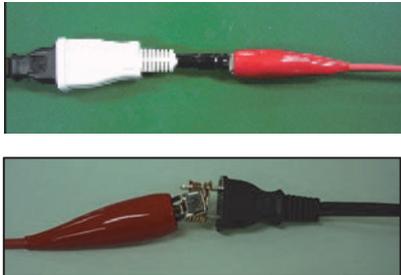
You cannot take accurate measurements if the power switch of the electrical appliance is turned off.

(2)



Connect the **low-voltage test lead (black)** to the test point on the electrical appliance (surface of the body of the appliance, ground terminal, or other test point).

(3)



Connect the **high-voltage test lead (red)** to the test point on the electrical appliance (the short-circuited part of the plug or the short-circuited leads of the receptacle that is connected to the plug).

(4) Check that **no one is near the testing area** and turn on the main power to the 3159.

(5)



Check that the analog voltmeter is indicating **0 kV**

and that the **⚡ DANGER ⚡** lamp is **not**

illuminated.

(6)



Set the three parameters mentioned in "1. Preparation": **Test voltage**, **Reference leakage current value** (upper limit for the test), and **Test time**. Refer to "3. Simple Startup Inspection (Settings)."

Set the test voltage after starting the test (while checking the measured voltage value).

6. Start the Test

Set the test voltage after pressing the START key to start the test.

Check the values to be used before pressing the START key.

⚠ DANGER

When a test is started, high voltage is generated by the 3159 when it enters the **TEST state. Do not touch the output voltage HIGH terminal (red), test leads, electrical appliance (device to be tested), or short-circuited receptacle while the **⚠ DANGER ⚠** lamp is illuminated.**

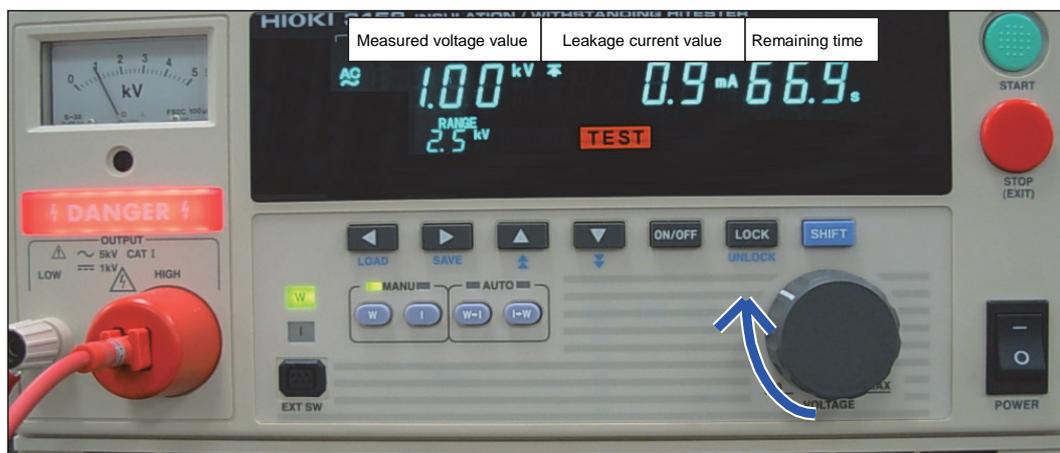
(1)



Press the START key to start the test.

To forcibly terminate the test process, press the STOP (EXIT) key.

(2)



The test requires the voltage to be applied for 60 seconds.

After pressing the START key, turn the output voltage knob to set the voltage to the test voltage before **the remaining time reaches 60 seconds.**

⚠ CAUTION Turning the output voltage knob excessively can raise the voltage over the test voltage, resulting in damage to the electrical appliance.

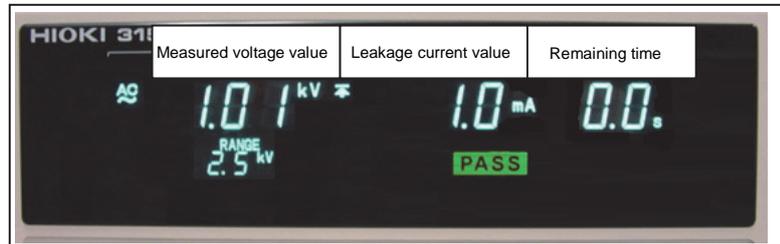
To Set the Test Voltage

To set the test voltage, turn the output voltage knob while checking the measured voltage value.

It may take time to get used to setting the test voltage.

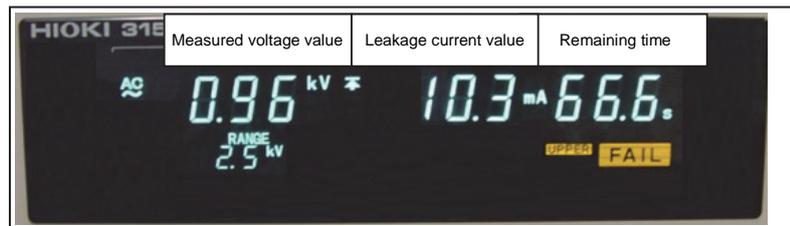
7. Finish the Test

(1) When the result is "PASS"



A "PASS" judgment will be given if the electric appliance withstands the test voltage for the set test time. ("PASS" will be displayed for approximately 0.5 seconds by default; however the "PASS" indication can be retained. See "4.1 PASS Hold Function" in the 3159 instruction manual.) Record the result as **PASS** in the record form or other documents.

(2) When the result is "FAIL"



An "UPPER FAIL" judgment will be given and the 3159 will beep if the electric appliance fails to withstand the test voltage for the set test time.

Record the result as **FAIL** in the record form or other documents.

(If the measured voltage value, leakage current value, and remaining time are also necessary, record them as well.)

(3) If the FAIL Hold function is enabled, press the STOP (EXIT) key to cancel the hold state.

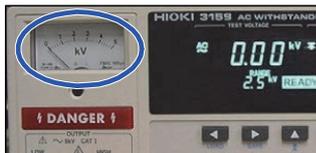
<After the test>

(1)



Return the output voltage knob to **zero**. (Turn the knob all the way counter-clockwise)

(2)



Check that the analog voltmeter indicates **0 kV** and that the **DANGER** lamp is **not illuminated**.

(3) Turn the main power switch of the 3159 off.

To conduct further tests, start from "5. Preparation Before the Test" of this measurement guide.

(4) Disconnect the electrical appliance, test leads, and power cord in the reverse order of connection.

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 - The latest revisions of instruction manuals and manuals in other languages.
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