

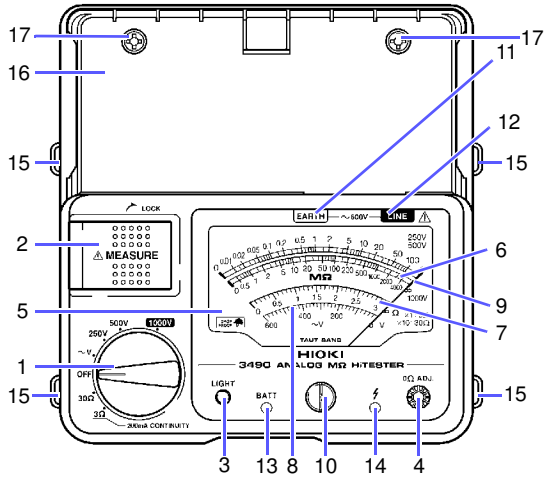
1st effective measuring range	±1.5% of scale length	
2nd effective measuring range	±1.5% of scale length	
0 MΩ, ∞ scale	±1.5% of scale length	

Resistance Measurement		
Ranges	3 Ω	30 Ω
Effective maximum indicated value	3 Ω	30 Ω
Center scale value	1.5 Ω	15 Ω
Measuring range	0 to 3 Ω	0 to 30 Ω
Accuracy	±0.09 Ω	±0.9 Ω
Open-circuit voltage	4.1 to 6.9 V	
Measuring current	200 mADC or more	20 mADC or more
Possible number of measurements (5sec ON, 25sec OFF)	1000 times (at 1 Ω)	1000 times (at 10 Ω)
Effect of temperature	±3% of effective maximum scale value	
Effect of position (Horizontal ±90°)	±3% of effective maximum scale value	
Overload protection	720 VAC (10 sec., by Fuse)	

AC Voltage Measurement	
Measuring range	0 to 600 V
Accuracy	±5% of maximum scale value
Frequency range	50/60 Hz
Input resistance	100 kΩ or more (50Hz/60Hz)
Effect of temperature	±5% of maximum scale value
Effect of position (Horizontal ±90°)	±2% of maximum scale value
Overload protection	660 VAC (10 s)

- Effect of temperature is applicable to the temperature range other than 18 to 28°C
- Accuracy for the low resistance measurement is applicable after zero adjustment (when the temperature changes more than ±1°C after zero adjustment, another zero adjustment is necessary)
- Accuracy is applicable after adjustment by meter movement zero adjuster

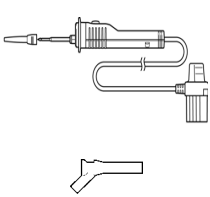
Names and Functions of Parts



1. Function switch: Select measurement functions
2. MEASURE key: Press to measure insulation resistance or low resistance.
3. LIGHT key: Press this key to turn on the light
4. 0Ω ADJ Knob: Use in zero adjustment before low resistance measurement
5. Scale plate
6. Insulation resistance scale: Read blue scale at 250 V, 500 V and red scale at 1000 V
7. Low resistance scale: Read as it is at 3 Ω and multiply by 10 at 30 Ω
8. AC voltage scale
9. Indicator needle
10. Meter movement zero adjuster
11. EARTH terminal: Connect the black test lead
12. LINE terminal: Connect the red test lead
13. Effective battery range indicator: Green when battery power is high, red when batter power is decreasing and no light when battery is drained
14. Live circuit indicator: Lights up when voltage remains between input terminals
15. Strap opening: Pass the supplied strap through the opening
16. Test lead storage space: Stores the test lead without having to remove it from the measurement terminal
17. Sleeve stand: Attach the sleeve removed from the tip of the test lead.

Options

- **L9787-91 Breaker Pin**
(Pin length 70 mm and 48 mm from the tip has width 2.5 mm. The rest have width 3.8 mm.) Breaker pin for L9787.
- **L9788-92 Breaker Pin**
(Pin length 123 mm and 65 mm from the tip has width 2.6 mm.) Breaker pin for L9788-92.



- **L9788-10 Test Lead with Remote Switch (Red) (1.2 m)**
Test lead with MEASURE key for the line side measurement. Measurement can be started by pressing the key. There is a light at the tip which can be switched on by pressing the LIGHT key on the 3490. Earth side lead is not attached.
- **9804-02 Magnetic Adapter**
(Ø11 mm Corresponding standard screw: M6 Button head screw)
Adaptor for connecting a Test lead to the round head screw by means of magnetism. The tip of adaptor is a concave shape in order to fit the round head screw.
Put an adaptor on the tip of the earth side lead of a L9787 Test Lead or L9788-11 Test Lead Set with Remote Switch

Replacing of Batteries and Fuses

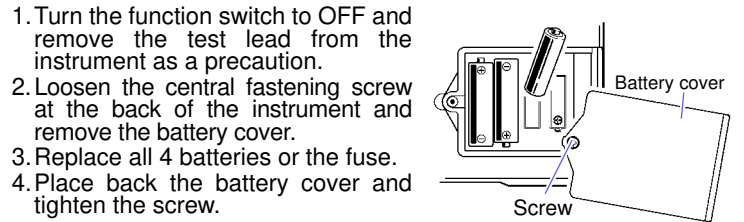
WARNING

- To avoid electric shock, turn off the function switch and disconnect the test leads from the object to be measured, before replacing the batteries or fuse.
- To avoid electric shock, turn off the MEASURE key and disconnect the test leads before replacing the batteries or fuse.
- After replacing the batteries or fuse, place back the cover and tighten the screws before using the instrument.
- Do not mix old and new batteries, or different types of batteries. Also, be careful to observe battery polarity during installation. Otherwise, poor performance or damage from battery leakage could result.
- Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire.
- Handle and dispose of batteries in accordance with local regulations.
- Please use only the specified fuse. Specified fuse can be purchased, so contact your dealer or Hioki representative. Using a non-specified fuse or shorting the fuse holder may cause a life-threatening hazard.

Fuse type: FF0.5AH/ 1000 V (70 172 40.0.500: SIBA)
(Very fast acting, arc extinction type, high rupturing capacity type)
Fuse can be purchased from your Hioki distributor.

NOTE

- To avoid corrosion from battery leakage, remove the batteries from the instrument if it is to be stored for a long time.
- Please use only alkali battery. Please do not use manganese, nickel-metal hydride or Oxyride batteries.

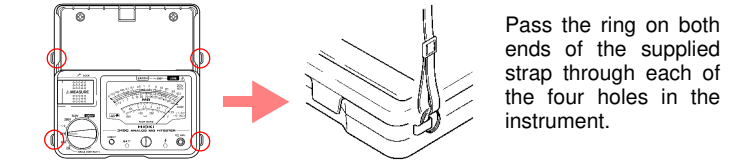


Measurement Procedures

Preparing for Measurement

1. Attach the strap.
2. Insert the batteries.
3. Connect the test lead (connect the black test lead to the EARTH terminal, and the red test lead to the LINE terminal)

Attaching the strap



Pre-measurement inspection

- Adjust the needle to point to zero before measuring. With the function switch at OFF, turn the meter movement zero adjuster with a screw driver until the needle points to the center part of the ∞ in the scale.
- Verifying the solid connection and integrity of the test leads
 1. Turn the function switch to one of the Insulation Resistance Measurement functions.
 2. Short circuit the tips of the test leads.
 3. Push down the MEASURE key, and confirm that the needle is pointing to 0 MΩ.
- Confirming the battery power
Set the function switch away from OFF and confirm the effective

battery range indicator. Battery power is high when a green light is shown. Battery power is low when a red light is shown and replacement is recommended. Battery is drained when no light is shown. Please replace the batteries then.

Auto power save (power-saving function)

When the function switch is not at OFF, the power save function automatically kicks in 15 minutes after the last time the MEASURE key is pressed and the effective battery range indicator goes off. The automatic power save function cannot be cancelled.

Reviving from power save

Turn off the function switch then return to the original position.

Insulation Resistance Measurement

WARNING

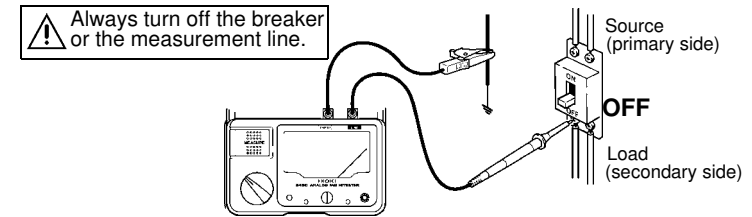
Observe the following to avoid electric shock, short circuits, and damage to the instrument.

- When measuring insulation resistance, dangerous voltage is applied to the measurement terminals. To avoid electric shock, do not touch the probe.
- Never touch the object being measured immediately after measuring. There is danger of electric shock from the charge accumulated during high voltage testing.
- Discharge the subject conductor after measurement.
- Do not attempt to measure insulation resistance on a live conductor. Doing so could damage the instrument or cause an accident that might result in injury or death. Always turn off power to the conductor being measured before starting.

NOTE

- Insulation resistance is the ratio of leakage current to applied voltage, and is therefore unstable. Depending on the specific object being measured, the needle may not stabilize, but this is not a meter malfunction.
- Press the MEASURE key fully down until a click is heard. If the button is not pressed down fully, the needle will not move from ∞ and a proper measurement cannot be made.
- Always release the MEASURE key after use.

1. Use the function switch to select the measurement voltage.
2. Connect the black test lead to the ground side of the object being measured.
3. Connect the red test lead to the line to be measured.
4. Press the MEASURE key. (To make continuous measurements, pull the button up.)
5. Read the value after the needle has stabilized.



- *When measuring an insulation resistance that contains a capacitance element, a charge proportional to the measurement voltage accumulates, and if undischarged could lead to an electric shock accident.
- 6. Without removing the test leads from the item being measured, release the MEASURE key.
- 7. The built-in discharge circuit automatically discharges the item. During a discharge, the needle will return slowly to the infinity (∞) position.
- 8. The discharge is completed when the needle reaches the ∞. The time required for discharge depends on the capacitance value.

AC Voltage Measurement

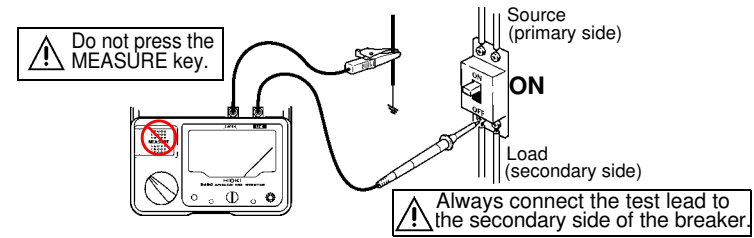
DANGER

- Test leads should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.
- Attempting to measure voltage in excess of the maximum input voltage and maximum rated voltage to earth could destroy the instrument and result in personal injury or death.
- To avoid electrical shock, be careful to avoid shorting live lines with the test leads.

WARNING

Never press the MEASURE key while measuring voltage. Doing so could damage the circuitry or cause a life-threatening accident.

1. Use the function switch to ~V (ACV).
2. Connect the black test lead to the ground side of the object being measured.
3. Connect the red test lead to the line to be measured.
4. Read the value after the needle has stabilized.



Low Resistance Measurement

WARNING

Do not measure under a live circuit condition.

Before measuring, zero adjustment to cancel the test lead wiring resistance, etc. is necessary.

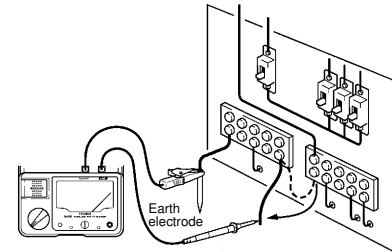
1. Turn the function switch to either 3 Ω or 30 Ω.
2. Short circuit the tip of the test lead.
3. Pull up the MEASURE key.
4. Turn the 0 Ω AJD knob and adjust the needle until it points to the center part of 0 Ω of the low resistance scale. (Adjust to 0 Ω, including the test lead line resistance for external resistance connected directly to the test object.) Push down the MEASURE key.
5. Connect the test lead to the ground side of the object being measured.
6. Press the MEASURE key and read the indicated value.
7. Turn off the MEASURE key after using.

Example of measuring the earthing conductor resistance

CAUTION

If an additional operating circuit is connected in parallel to the circuit under measurement, the measurement error may occur due to the effects of impedance of the circuit connected in parallel or transient currents.

Measure the earthing conductor resistance at 3 Ω range. Please refer to the low resistance measurement for measuring method.



Operation Uncertainty

The operation uncertainty and the variations of measurement value for the respective Influence quantity approved by EN61557 are as follows:

Intrinsic uncertainty/ Influence quantity	Operation range	Variation	
		Insulation Resistance	Low Resistance
A Intrinsic uncertainty	Reference condition	±2%	±3%
E ₁ Position	Horizontal ±90°	±2%	±3%
E ₂ Supply voltage	4.5 V to 6.8 V	±1%	±3%
E ₃ Temperature	0°C to 35°C	±1.5%	±3%
B Operation uncertainty		±8%	±9%
Guaranteed range of operation uncertainty		1st effective measurement range	0~ effective maximum scale value

Influencing factor non-applicable for E₄ to E₁₀

Measurement principles

1. Insulation Resistance Measurement

The insulation resistance of test object Rx is obtained by supplying a voltage V to the test object and measuring the current leaking from the test object and the voltage supplied using the formula (Voltage supplied, V)/(current leakage, I).

2. AC Voltage Measurement

This is obtained from converting the value of the current flowing from the voltage source through the instrument to a voltage value.

3. Low Resistance Measurement

The resistance of test object Rx is obtained by supplying a specific current I to the test object and measuring the voltage occurring between the test terminals using the formula (inter-terminal voltage, V)/(supplied current I).