

3454-11

DIGITAL MΩ HiTESTER

Instruction Manua

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HIOKI

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Introduction

Thank you for purchasing the HIOKI "3454-11 DIGITAL MΩ HiTESTER". To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

Initial Inspection

When you receive the instrument, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories, panel switches, and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

Preliminary Checks

- Before using the instrument the first time, verify that it operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.
- Before using the instrument, make sure that the insulation on the test leads and connection cords is undamaged and confirm that the white or red portion (insulation layer) inside the cable is not exposed. If a color inside the cable is exposed, do not use the cable. Using the product in such conditions could cause an electric shock, so contact your dealer or Hioki representative for replacements (Model L9787).

Maintenance and Service

- To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- If the instrument seems to be malfunctioning, confirm that the batteries are not discharged, and that the test leads and fuse are not open circuited before contacting your dealer or Hioki representative.
- When an indication Err.9 appears, send the instrument for repair.

Specifications

General Specifications

Guaranteed accuracy period	1 year at 23°C±5°C (73°F±9°F) and 90% RH
Display	Max. 4000 LCD
Sampling rate	twice/second
Response time	Insulation resistance (∞ → 0, ∞ → center value), resistance: Within 5 s, ACV: Within 2 s
Operating Temperature & Humidity	0 to 40°C (32 - 104°F), 90%RH or lower (non-condensating)
Storage Temperature & Humidity	-20 to 50°C (-4 - 122°F), 90%RH or lower (non-condensating)
Operating Environment	Indoors, altitude up to 2000 m (6562-ft.) ASL, Pollution Degree 2
Effect of temperature	±2% of reading ±5 dgt, plus basic allowance (Resistance Measurement 4 MΩ range: ±5% of reading plus basic allowance)
Influence quantity	E ₁ (Position) : 0% E ₂ (Supply voltage) : Twice of the intrinsic uncertainty E ₃ (Temperature) : ±2%±5dgt. (Influencing factor non-applicable for E ₄ to E ₁₀)
Degree of protection	IP40 (condition which the test lead is connected)
Power source	Rated power voltage: 1.5 V DC × 4, R6P manganese battery × 4 or LR6 alkaline battery × 4
Maximum rated power	3 VA

Continuous operating time	Insulation → ∞ measurement at 250 V and 500 V for about 10 hours, at 1000 V for about 10 hours (with manganese battery)
Possible number of measurements	250 V at 0.25 MΩ 300 times (R6P battery), 1600 times (LR6 battery) 500 V at 0.5 MΩ 250 times (R6P battery), 1400 times (LR6 battery) 1000 V at 1.0 MΩ 200 times (R6P battery), 1000 times (LR6 battery) Ω at 1.0 Ω 1000 times (R6P battery), 1000 times (LR6 battery)
Additional function	Automatic power-saving mode, Comparator, High-voltage warning, Warning indication of false voltage input, Data hold, Display lighting, 1000 V output error protection, Zero adjustment
Dielectric strength	5550 V AC 50/60 Hz for one minute Between electric circuit and case
Maximum input voltage	600 V AC, Measurement Category III
Maximum rated voltage to earth	(Anticipated Transient Overvoltage: 6000 V)
Input error protection for 10 second (overvoltage protection)	600 V AC (ACV function: 800 V AC) (MΩ-1000 V function: 1200 V AC)
Dimensions (excluding protrusions)	175W × 148H × 56D mm approx. 6.89"W × 5.83"H × 2.20"D approx.
Mass	530 g, 18.7 oz. approx. (including batteries)
Accessories	L9787 Test Lead, Instruction Manual, R6P manganese battery × 4, Strap
Options	L9787-91 Breaker Pin, 9804-02 Magnetic Adapter, L9787 Test Lead
Standards applying	Safety EN61010 EMC EN61326 EN 61557-1/-2/-4

rdg. :reading value (The value currently being measured and indicated on the measuring instrument)

dgt. :resolution (The smallest displayable unit, i.e., the input value that causes the digital display to show a "1".)

Insulation Resistance Measurement

Rated output voltage (DC)	Max. effective reading	Center scale reading
250 V / 500 V	500 MΩ	10 MΩ
1000 V	4000 MΩ	100 MΩ

Rated output voltage	Display range	Max. reading	Resolution
250 V / 500 V / 1000 V	4 MΩ range	4.000 MΩ	0.001 MΩ
	40 MΩ range	40.00 MΩ	0.01 MΩ
	400 MΩ range	400.0 MΩ	0.1 MΩ
250 V / 500 V	500 MΩ range	500 MΩ	1 MΩ
	1000 V	4000 MΩ range	4000 MΩ

* Resistances of 1000 MΩ or higher are indicated in increments of 10 MΩ i.e., 1010 MΩ, 1020 MΩ, etc.

Rated output voltage	Name of measurement range	Measurement range	Accuracy & Intrinsic uncertainty A
250 V / 500 V	1st effective measurement range	0.200 to 50.0 MΩ	±3%rdg. ±4dgt.
	2nd effective measurement range	50.1 to 500 MΩ	±5%rdg. ±5dgt.
	other measurement range	0 to 0.199 MΩ	
1000 V	1st effective measurement range	0.200 to 200.0 MΩ	±3%rdg. ±4dgt.
	2nd effective measurement range	200.1 to 4000 MΩ	±5%rdg. ±5dgt.
	other measurement range	0 to 0.199 MΩ	

Operation uncertainty B: ±18% (1st effective measurement range)
 Measurement terminal voltage characteristic.

Rated output voltage	Open circuit voltage	Lower limit measurement resistance value to be maintained rated output voltage	Rated current	Short circuit current
250 V	1 to 1.2 times of nominal test voltage	0.25 MΩ	1 to 1.2 mA	1.2 mA max.
500 V		0.5 MΩ		
1000 V		1 MΩ		

Effect of radiated radio-frequency electromagnetic field: 3 V/m, within +10%rdg.

Resistance Measurement

Display range	Max. reading	Resolution	Accuracy & Intrinsic uncertainty A (After 0 Ω Adjustment)
40 Ω range	40.00 Ω	0.01 Ω	±3%rdg. ±6dgt.
400 Ω range	400.0 Ω	0.1 Ω	
4 kΩ range	4.000 kΩ	0.001 kΩ	
40 kΩ range	40.00 kΩ	0.01 kΩ	±5%rdg. ±6dgt.
400 kΩ range	400.0 kΩ	0.1 kΩ	
4 MΩ range	4.000 MΩ	0.001 MΩ	

Short circuit current: 200 mA or more, open circuit voltage: 5 VDC±1 V
 Operation uncertainty B: ±30% (0.2 to 400 Ω)

AC Voltage Measurement

Display range	Max. reading	Resolution	Accuracy (Guaranteed at 600 V or less)
600 V range	750 V	1 V	±3%rdg. ±6dgt.

Input resistance: 100 kΩ or more, Frequency range: 50 to 60 Hz

Safety

DANGER

This instrument is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the instrument. Using the instrument in a way not described in this manual may negate the provided safety features. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from instrument defects.

Measurement Categories

This instrument complies with CAT III safety requirements. To ensure safe operation of measurement instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.) CAT II covers directly measuring electrical outlet receptacles.

CAT III: Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.

CAT IV: The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel). Using a measurement instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided. Use of a measurement instrument that is not CAT-rated in CAT II to CAT IV measurement applications could result in a severe accident, and must be carefully avoided.

Safety Symbol

This manual contains information and warnings essential for safe operation of the instrument and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the instrument. The ⚠ symbol printed on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
	Indicates that dangerous voltage may be present at this terminal.
	Indicates a double-insulated device.
	Indicates AC (Alternating Current).
	Indicates DC (Direct Current).

The following symbols in this manual indicate the relative importance of cautions and warnings.

- DANGER** Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
- WARNING** Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
- CAUTION** Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument
- NOTE** Indicates advisory items related to performance or correct operation of the instrument.

Usage Notes

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

DANGER

- **Observe the following precautions to avoid electric shock.**
- Be sure to disconnect the test lead from the object to be measured and turn the function switch OFF before connecting or disconnecting the test lead from the MΩ HiTESTER.
- Always verify the appropriate setting of the function selector before connecting the test leads.
- Disconnect the test leads from the measurement object before switching the function selector.

WARNING

- Do not use the instrument where it may be exposed to corrosive or combustible gases. The instrument may be damaged or cause an explosion.
- Do not allow the instrument to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- Do not use any other electrical source other than the batteries. The use of any other sources may result in damage of the instrument or the object to be measured and also may cause electric shock.
- Before using the instrument, make sure that the insulation on the test leads and confirm that the white or red portion (insulation layer) inside the cable is not exposed. If a color inside the cable is exposed, do not use the cable. Using the product in such conditions could cause an electric shock, so contact your dealer or Hioki representative for replacements (Model L9787).

WARNING

- Do not use the instrument where it may be exposed to oil, chemicals, or solvents. Contact with these substances may cause cracking in the instrument, resulting in damage or electric shock.

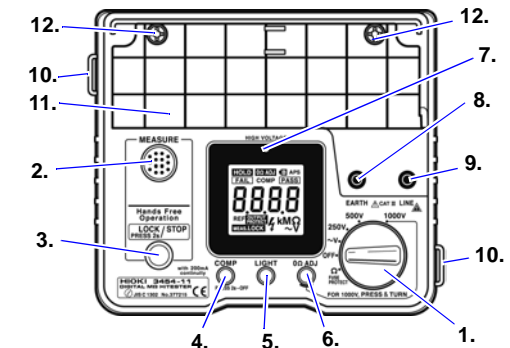
CAUTION

- If the protective functions of the instrument are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- This instrument is designed for use indoors. It can be operated at temperatures between 0 and 40°C without degrading safety.
- Do not store or use the instrument where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the instrument may be damaged and insulation may deteriorate so that it no longer meets specifications.
- For safety reasons, when taking measurements, only use the L9787 Test Lead (or optional) provided with the instrument.
- To avoid damage to the instrument, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.
- Calibration and repair of this instrument should be performed only under the supervision of qualified technicians knowledgeable about the dangers involved.
- Removable sleeves are attached to the metal pins at the ends of the test leads. To prevent a short circuit accident, be sure to use the test leads with the sleeves attached when performing measurements in the CAT III measurement categories. Remove the sleeves from the test leads when performing measurements in the CAT I and CAT II measurement categories. For details on measurement categories, see "Measurement categories" in the instruction manual.

NOTE

- To avoid battery depletion, turn the function selector OFF after use (the Auto Power Save feature consumes a small amount of current).
- The safety sleeve is attached to the test lead plug. Remove the sleeve before connecting to the instrument.

Names and Functions of Parts



1. Function Selector: Selects among power ON/OFF, the output voltage for insulation resistance measurement, ACV, or resistance (Ω).
2. MEASURE Key: Used to measure resistance and insulation resistance. This key remains ON while it is held down.
3. LOCK Key: Used to measure resistance and insulation resistance. This key switches ON if held down for more than 2 seconds. Press the key again to turn it OFF.
4. COMP Key: Used for the comparator function
5. LIGHT Key: Turns the display light ON/OFF. The light automatically switches OFF after 30 seconds.
6. ΩADJ Key: Used for the zero-adjust function in resistance measurement. Used when "1000 V" is selected in insulation-resistance measurement. Used to select the buzzer sound in the comparator function
7. High-voltage warning lamp: Begins flashing if the input voltage exceeds AC 70 V (±10 V) and during insulation resistance measurement.
8. EARTH Measurement Terminal: Connect the black test lead to this terminal.
9. LINE Measurement Terminal: Connect the red test lead to this terminal.
10. Strap Hole: Pass the strap through this hole.
11. Test lead Housing: Houses the test leads. The test leads may be housed without disconnecting them from the terminals after use.
12. Sleeve stand: Attach the sleeve removed from the tip of the test lead.

Display Block

HOLD : Lights up when the measured value is held during the resistance/insulation-resistance measurement.

FAIL : Lights up when the measured value is less than the criterion for the comparator function during insulation-resistance measurement, or when the measured value is greater than the criterion during resistance measurement.

Ω ADJ : Lights up when Ω adjustment is made during resistance measurement.

APS : Indicates that battery power is low. (during which time accuracy cannot be guaranteed).

COMP : Lights up when the comparator function is enabled.

MEAS. LOCK : Lights up when auto power save is enabled.

MEAS. LOCK : Lights up when the measured value is less than the criterion for the comparator function during insulation-resistance measurement, or when the measured value is greater than the criterion during resistance measurement.

