

# HIOKI

## 3118

### MΩ HiTESTER

#### INSTRUCTION MANUAL

November 2002 Revised edition 1  
3118A981-01 02-11H Printed in Japan

#### Introduction

Thank you for purchasing the Hioki 3118 MΩ HiTESTER. To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

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#### Inspection

When you receive the product, inspect it carefully to ensure that no damage occurred during shipping. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

#### Maintenance and Service

To clean the product, 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 product seems to be malfunctioning, confirm that the batteries are not discharged, and that the test probes are not open circuited before contacting your dealer or Hioki representative.

Pack the product carefully so that it will not be damaged during shipment, and include a detailed written description of the problem. Hioki cannot be responsible for damage that occurs during shipment.

<div><div><div><div><div><span></span></div><div><b>HIOKI</b></div></div></div><div><div><div><span></span></div><div><small>HIOKI E.E. CORPORATION</small></div></div></div></div></div> <div>INSPECTION CERTIFICATE</div> <div><div>HIOKI E.E. CORPORATION hereby certifies that the under-mentioned product(s) has been tested and inspected in accordance with applicable HIOKI calibration procedures, and proven to meet or exceed published measurement specifications. We also certify that the measurement standards and instruments used in the calibration procedure are traceable to the national standards organization.</div></div> <div><div>Model: <u>3 1 1 8</u></div><div>S/N: _____</div></div> <div><div>INSPECTOR</div><div><u>T. Kobayashi</u></div><div>T.Kobayashi</div></div>
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#### Specifications

##### General Specifications

Operating temperature and humidities	0 to 40°C (32 to 104°F), 90% RH max (with no condensations)
Storage temperature and humidities	-10 to 50°C (-4 to 122°F), 90% RH max (with no condensations)
Operating environment	Altitude up to 2000 m (6562 feet)
Power source	Rated power voltage: 1.5 VDC X 6, R6P manganese battery X 6 External power (DC8.5 V/600mA, MAX. 10 V)
Maximum rated power	4 VA
Continuous operating time	Approx. 8 hours at 500 V, 1 MΩ (using manganese batteries)
Dielectric strength	3 kVAC 50/60 Hz for one minute Between electric circuit and case
Dimensions (excluding protrusions)	106W X 145H X 52D mm approx. 4.17"W X 5.71"H X 2.05"D approx.
Mass	500 g, (17.6 oz.) approx. (including batteries)
Accessories	9294 TEST PROBE 9363 CARRYING CASE (3118-11) 9364 CARRYING CASE (3118-12) Instruction Manual, Instruction label R6P manganese battery X 6, Spare fuse
Option	9288 BREAKER PIN, 9289 TEST PROBE, 9257 CONNECTION CORD

##### Specifications

Guaranteed at 23±5°C(73±9°F), 90% RH or less, for 1 year.

Model	3118-11		3118-12	
Rated voltage	250 V	500 V	500 V	1000 V
Maximum effective reading	50 MΩ	100 MΩ	200 MΩ	2000 MΩ
1st effective measurement range	0.05 to 20 MΩ	0.1 to 50 MΩ	0.1 to 50 MΩ	2 to 500 MΩ
	±5% of scale reading			
2nd effective measurement range	20 to 50MΩ	50 to 100MΩ	50 to 200MΩ	500 to 2000MΩ
	±10% of scale reading			
Other accuracy	±0.7% of scale length (including 0 and ∞ reading)			
Measurement terminal voltage accuracy	±10% of rated voltage at infinity ∞			
	90% min. of rated voltage at 1 MΩ (3118-12: 1000 V range at 20 MΩ)			
Effective of temperature (0 to 40℃)	±5% of scale reading plus basic allowance at 1 MΩ (3118-12: 1000 V range at 20 MΩ)			
	±0.7% of scale length plus basic allowance at 0 and ∞			
Measurement current (when short-circuited)	3.4 mA			0.32 mA
Response time	3 s or less at 1 MΩ or 0 (3118-12: 1000 V range at 20 MΩ)			
Overload protection (measurement terminal)	280 V rms	600 V rms	600 V rms	1100 V rms
Discharge function	Yes	No	Yes	No
Resistance range and accuracy	0 to 100 Ω / ±3% of scale length			
Effective of temperature (0 to 40℃)	±3% of scale length plus basic allowance			
Open terminal voltage	310 mV max.			
Overload protection	250 V rms (Fuse protection: 1 A/250 V with non-arcing type )			
AC voltage range and accuracy	0 to 600 V ±7% of maximum scale value (50/60 Hz)			
Effective of temperature (0 to 40℃)	±7% of maximum scale value			
Input resistance	Approx. 160 kΩ		Approx. 3.3 MΩ	
Overload protection	700 V rms			

#### Safety

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

##### Safety Symbols

⚠	<ul style="list-style-type: none"><li>The ⚠ symbol printed on the product indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.</li><li>In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the product.</li></ul>
⚡	Indicates that dangerous voltage may be present at this terminal.
~	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 product.
NOTE	Advisory items related to performance or correct operation of the product.

##### Notes on Use

##### ⚠ DANGER

Before connecting probes to the product, check that the probes are disconnected from the object to be measured.

##### ⚠ WARNING

- To avoid electric shock, do not allow the product to get wet, and do not use it when your hands are wet.
- Before using the product, make sure that the insulation on the probes is undamaged and that no bare conductors are improperly exposed. Using the product in such conditions could cause an electric shock. Replace the test probes with the specified Hioki Model 9294.
- Do not use the product where it may be exposed to corrosive or combustible gases. The product may be damaged or cause an explosion.

##### ⚠ CAUTION

- Do not store or use the product where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.

##### NOTE

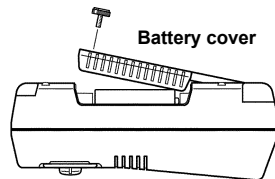
- Before use check that batteries are charged. Replace the old batteries with fresh one if they are low.
- When not in use for a long time, to prevent possible corrosion caused by battery leakage, remove the batteries before storage.
- Always release the **MEASURE** button after use.
- The meter display is glass, so avoid subjecting it to strong impacts.
- This product is provided with a label containing measurement instruction and precautions. After purchase, be sure to fix this label to the battery cover on the back of the product.
- Before use, check whether the product operates properly. You can do this by performing Insulation Resistance Measurement, then pressing the **MEASURE** button in the MΩ setting (the indicator should read zero). If the needle remains in the position, the fuse has blown. In this case, replace the fuse with a new one of the same rating (refer to "Fuse and Battery Replacement").

#### Fuse and Battery Replacement

##### ⚠ WARNING

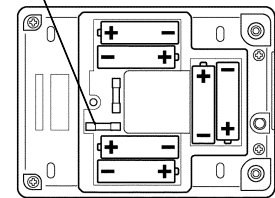
- To avoid electric shock when replacing the batteries, first disconnect the test probes from the object to be measured. Before using the product after replacing the batteries, replace the cover and screw.
  - Do not mix old and new batteries, or different types of batteries. Also, be careful to observe battery polarity during installation. Otherwise, poor performance or damage from battery leakage could result.
  - To avoid the possibility of explosion, do not short circuit, disassemble or incinerate batteries.
  - Keep batteries away from children to prevent accidental swallowing.
  - Replace the fuse only with one of the specified characteristics and voltage and current ratings. Using a non-specified fuse or shorting the fuse holder may cause a life-threatening hazard.
- Fuse type: MF51NR1-S 1 A, 250 V (non-arcing) 20 mm X 5 mm dia.

- Rotate the decorative screw with a coin or similar object.
- Remove the battery cover.

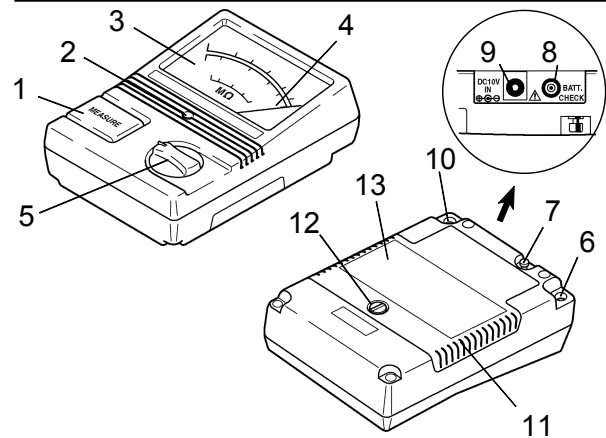


Spare fuse

- Insert six new batteries. If the fuse has blown, replace it with a new one.



## Names and Functions of Parts



1. **MEASURE button**  
Press to measure insulation resistance.
2. **Zero-adjustment**
3. **Display and scale**
4. **Indicator needle**
5. **Function selector** ( $\Omega$ /ACV/M $\Omega$ )
6. **Earth measurement terminal**  
Connect the EARTH probe (black).
7. **Guard terminal**
8. **Battery check terminal**  
Use with LINE probe.
9. **DC IN:** External power supply jack (DC8.5 V/600mA, MAX. 10 V, has  $\phi$ 5 mm-dia.-terminals and has a center pin with negative polarity)
10. **Line measurement terminal**  
Connect the LINE probe (red).
11. **Battery cover**
12. **decorative screw**
13. **Instruction label (fix the label here)**

## Measurement Procedure

### Insulation Resistance Measurement

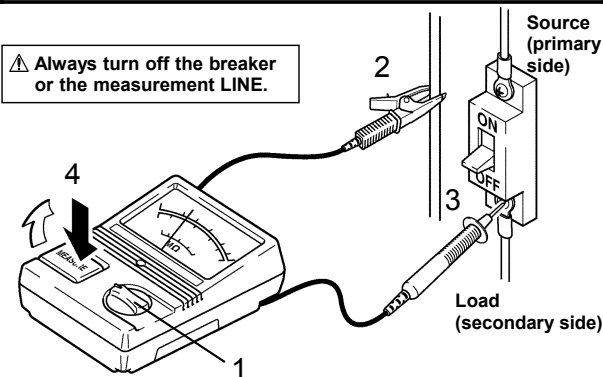
#### ⚠ WARNING

Observe the following to avoid electric shock and short circuits.

- **Do not attempt to measure insulation resistance on a live conductor. Doing so could damage the product or cause an accident that might result in injury or death. Always turn off power to the conductor being measured before starting.**
- **The maximum permissible input is indicated in the specifications. Do not measure voltage in excess of these limitations, as doing so may damage the product or cause an accident that might result in injury or death.**
- **When measuring insulation resistance, dangerous voltage is applied to the measurement terminals. To avoid electric shock, do not touch the probe.**
- **To avoid electrical shock, never touch the external power input terminal and BATT.CHECK terminal while measuring insulation resistance.**

#### ⚠ CAUTION

When discharging, do not set the function selector to the  $\Omega$  position. It may result in damage to the product.



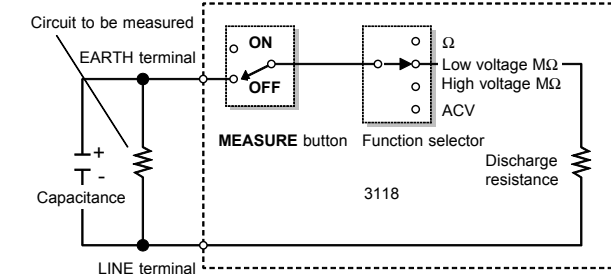
1. Set the function selector to either M $\Omega$  position. (3118-11: 250/500 V, 3118-12: 500/1000 V)
2. Connect the black EARTH probe to the ground side of the object being measured.
3. Connect the red LINE probe to the LINE to be measured.
4. Press the **MEASURE** button. (To make continuous measurements, pull the button up.)
5. Read the value after the needle has stabilized.

#### NOTE

- Insulation resistance is the ratio of leakage current to input voltage, and is therefore unstable. Depending on the circuit being measured the needle may stabilize, but this is not a meter malfunction.
- When measuring insulation between communication cables or other systems with a capacitance element, the needle will move first quickly to the left, then gradually return to the right, and it may take some time to become stabilized. This is not a sign of malfunction. Read the value after the needle has stabilized.

### Discharge Function

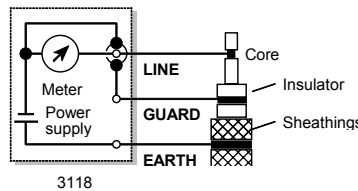
- When measuring an insulation resistance that contains a capacitance element, that element will be charged with an electric load proportional to the measurement voltage.
- After measuring a circuit with capacitance, release the **MEASURE** button and set the function selector to 250 V (3118-11) or 500 V (3118-12) before detaching the probes. This will activate the 3118 built-in discharge circuit.



- The time required for discharge depends on the capacitance value. As a reference, observe the indicator needle. During discharge, it will go beyond, then return gradually. discharge is practically completed when needle reaches the  $\infty$  symbol.
- Make it a practice to discharge the subject conductor after measurement.

#### Guard terminal use

The guard terminal eliminates the effects of test object surface leakage resistance to measure only volumetric resistance. For measurement of cables and similar objects, as indicated in the diagram, wrap a bare wire (about 0.5 mm in diameter) around the insulator to be measured and connect this to the GUARD terminal. The leakage current flowing through the surface of the insulator will not be displayed, making it possible to accurately measure volumetric resistance.



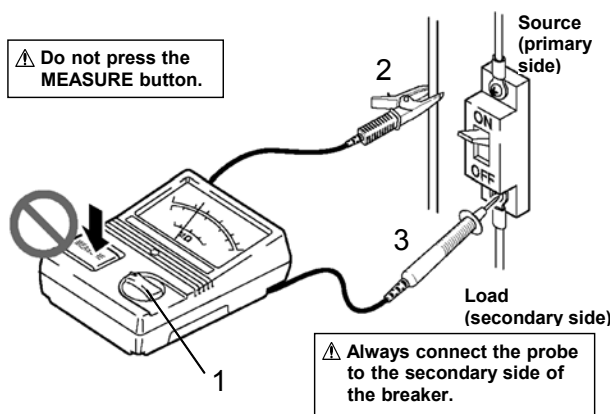
## AC Voltage Measurement

#### ⚠ DANGER

- **Test probes 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.**
- **The maximum permissible input is 700 Vrms. Attempting to measure voltage in excess of the maximum rating could destroy the product and result in personal injury or death.**
- **To avoid electrical shock, never touch the external power input terminal and BATT.CHECK terminal while measuring voltage.**
- **To avoid electrical shock, be careful to avoid shorting live lines with the test probes.**

#### ⚠ WARNING

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



1. Set the function selector to ACV.
2. Connect the black EARTH probe to the ground.
3. Connect the red LINE probe to the line to be measured.
4. Read the voltage value on the AC scale after the needle stabilizes.

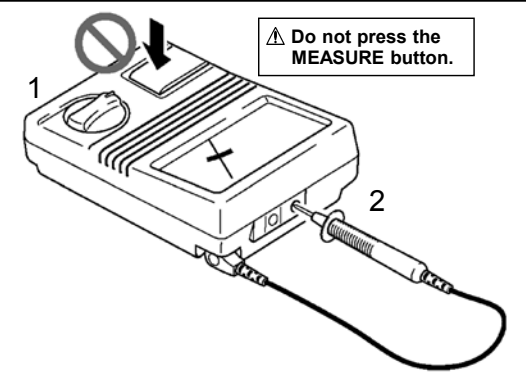
## Resistance Measurement

#### ⚠ DANGER

**Never apply voltage to test probes when the Resistance function is selected. Doing so may damage the product and result in personal injury. To avoid electrical accidents, remove power from the circuit before measuring.**

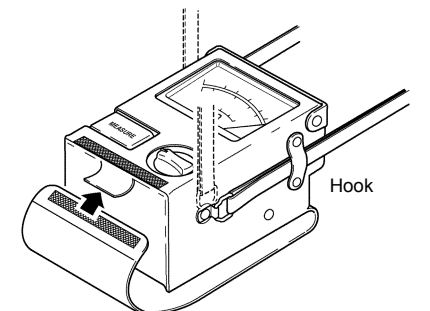
1. Set the function selector to  $\Omega$ .
2. Press the **MEASURE** button and attach the LINE and EARTH probes.
3. Read the resistance value on the  $\Omega$  scale.

## Battery Check Method

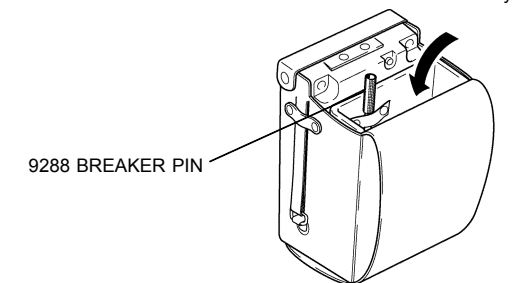


1. Set the function selector to B CH.
2. Connect the LINE probe tip to the BATT CHECK terminal.
3. If the needle is within the B range, the batteries can be used. If it is to the outside of the B range, replace the batteries with new ones.

## Using the Carrying Case



For use, fold the cover back as shown. Attach the belt to the hook as indicated when carried from your shoulder.



Remove the hook if the product is to be used while hung around your neck. Carry probes here. Carry the 9288 BREAKER PIN (option) here.

## Option

#### ⚠ DANGER

**To avoid electrical shock, be careful to avoid shorting live lines with the breaker pin.**

#### 9288 BREAKER PIN

Attach this to the tip of the LINE probe or pin type EARTH probes. It allows the tip to be extended, when otherwise it would be too short to make a measurement.

#### 9289 TEST PROBE

The black EARTH probe is a pin type probe like the LINE probe. This can not be attach to the 9288 BREAKER PIN.

#### 9257 CONNECTION CORD

The black EARTH probe is a clip type probe like the LINE probe.