

# HIOKI

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Instruction Manual

## **3255-50**

### **DIGITAL HiTESTER**

**HIOKI E. E. CORPORATION**

June 2013 Revised edition 7 3255D981-07 13-06H

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\*600028237\*



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## Introduction

Thank you for purchasing the HIOKI "3255-50 DIGITAL HiTESTER." To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

## Inspection

When you receive the product, 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.

## Accessories

- L9207-10 TEST LEAD ..... 1
- Instruction Manual ..... 1
- R03 Manganese battery ..... 2  
(Supplied with this product, for monitor)
- 9371 CARRYING CASE ..... 1

## Options

- 9010-50 CLAMP ON PROBE
- 9018-50 CLAMP ON PROBE
- 9704 CONVERSION ADAPTER  
(When used in combination with the  
9010-50/9018-50)

## Safety Notes

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.



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This product is designed to conform to 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 product. 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 product defects.

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## Safety Symbols

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

## Symbols

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

 <b><u>DANGER</u></b>	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
 <b><u>WARNING</u></b>	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
 <b><u>CAUTION</u></b>	Indicates that incorrect operation presents a possibility of injury to the user or damage to the product.
<b><u>NOTE</u></b>	Advisory items related to performance or correct operation of the product.

## Other Symbols



Indicates the prohibited action

## Accuracy

We define measurement tolerances in terms of f.s. (full scale), rdg. (reading) and dgt. (digit) values, with the following meanings:

- f.s.** (maximum display value or scale length)  
The maximum displayable value or the full length of the scale. This is usually the maximum value of the currently selected range.
- rdg.** (reading or displayed value)  
The value currently being measured and indicated on the measuring product.
- dgt.** (resolution)  
The smallest displayable unit on a digital measuring product, i.e., the input value that causes the digital display to show a "1".

## Measurement categories

This product conforms to the safety requirements for CAT III 600V, CAT II 1000V measurement products.

To ensure safe operation of measurement products, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

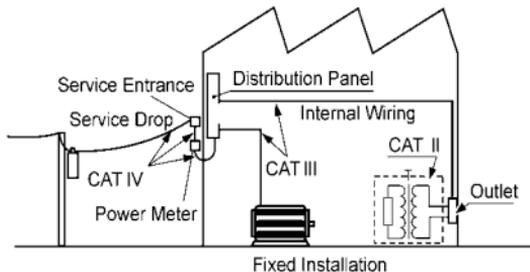
**CAT II:** Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.) CAT II covers directly measuring electrical outlet receptacles.

**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.



## Usage Notes



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

### Inspection before Use

- Before using the product 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, check that the coating of the test leads is not damaged and that no white or red portions (insulation layers) are showing from the inside and that no metal parts are exposed. Using the product under such conditions could result in electrocution. Replace the test leads with the specified Hioki Model L9207-10.

### Installation, Operating Environment, and Handling



- To avoid electric shock, do not allow the product to get wet, and do not use it when your hands are wet.
- Do not use the product where it may be exposed to corrosive or combustible gases. The product may be damaged or cause an explosion.



Observe the following to avoid damage to the product.

- **Installation and Operating Environment**  
Between 0°C and 40°C; 80% RH or less; indoors only. However, it can be safely operated at as low as -10°C.
- 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.
- Although this product is designed to resist the ingress of dust and water, it is not entirely water- or dust-proof, so to avoid shock or damage, do not use it in a wet or dusty environment.  
The protection rating for the enclosure of this device (based on EN60529) is \*IP54.
- Do not use the product near a device that generates a strong electromagnetic field or electrostatic charge, as these may cause erroneous measurements.
- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.

- \*IP54** This indicates the degree of protection provided by the enclosure of the device against use in hazardous locations, entry of solid foreign objects, and the ingress of water.
- 5:** Protected against access to hazardous parts with wire measuring 1.0 mm in diameter. Dust-proof type (The penetration of dust cannot be prevented completely, but quantities of dust that may hinder the stated operation of equipment or safety cannot penetrate the enclosure.)
  - 4:** The equipment inside the enclosure is protected against the harmful effects of water splashed against the enclosure from any direction.

**CAUTION**

- Adjustments and repairs should be made only by technically qualified personnel.
- If the protective functions of the product are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- To avoid corrosion from battery leakage, remove the batteries from the product if it is to be stored for a long time.

**NOTE**

- Accurate measurement may be impossible in the presence of strong magnetic fields, such as near transformers and high-current conductors, or in the presence of strong electromagnetic fields such as near radio transmitters.
- To avoid battery depletion, turn the function selector OFF after use (the Auto Power Save feature consumes a small amount of current).
- The **B** indicator appears when battery voltage becomes low. Replace the batteries as soon as possible.

## Handling the Cables

### **DANGER**

- 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 and CAT IV measurement categories. Remove the sleeves from the test leads when performing measurements in the CAT II measurement categories. For details on measurement categories, see "Measurement categories" (page 5) in the instruction manual.
- To prevent an electric shock accident, 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.

### **CAUTION**

- The ends of the test leads are sharp. Be careful to avoid injury.
- To avoid damaging the cables, do not bend or pull the cables.
- Avoid stepping on or pinching the cable, which could damage the cable insulation.

## Connection and Measurement

For other precautions and details, see explanations of the measurement procedures.

### NOTE

Use only the specified test lead or clamp-on probe. Using a non-specified cable may result in incorrect measurements due to poor connection or other reasons.

## When measuring a breaker

### **⚠ DANGER**

This product 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.

## Voltage Measurement

### **⚠ DANGER**

- The maximum input voltage is 1000 VDC, 1000 Vrms(sin), or  $10^7 \text{V} \cdot \text{Hz}$ . Attempting to measure voltage in excess of the maximum input could destroy the product and result in personal injury or death.
- The maximum rated voltage between input terminals and the ground is as follows;  
(CAT II) DC 1000 V, AC 1000 Vrms (sin) or  $10^7 \text{V} \cdot \text{Hz}$   
(CAT III) DC 600 V, AC 600 Vrms (sin) or  $10^7 \text{V} \cdot \text{Hz}$

Attempting to measure voltages exceeding this level with respect to ground could damage the product and result in personal injury.

## Resistance Measurement, Checking the Continuity or Diode



Never apply voltage to test leads when the Resistance, Continuity or Diode Check functions are selected. Doing so may damage the product and result in personal injury. To avoid electrical accidents, remove power from the circuit before measuring.

## Current Measurement

(When using the optional Clamp-on Probe)



Connect the Clamp-on probe to the product first, and then to the active lines to be measured.

Observe the following to avoid electric shock and short circuits.

- Never attach the clamp-on probe to a circuit that operates at more than 600 V, or over bare conductors.
- When the Clamp-on probe is opened, do not allow the metal part of the clamp to touch any exposed metal, or to short between two lines.



To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.

**CAUTION**

- To prevent damage to the product and Clamp-on probe, never connect or disconnect a sensor while the power is on.
- Be careful to avoid dropping the Clamp-on probe or otherwise subjecting them to mechanical shock, which could damage the mating surfaces of the core and adversely affect measurement.
- Keep the clamp jaws and core slits free from foreign objects, which could interfere with clamping action.

**NOTE**

Rectification method (true RMS and mean)

There are two methods for converting AC signal to an RMS value: the true RMS method (true RMS indication) and the mean method (mean rectification RMS indication). Although the two methods both yield the same value for a perfect (undistorted) sine wave, differences occur when the target waveform becomes distorted. The instrument uses the mean method (rectification RMS indication method). Input waveforms are treated as sine waves (single-frequency only), and the AC signal's mean value is calculated and converted to an RMS value. Waveform distortion causes the measurement error to increase.

# Overview

# Chapter 1

## 1.1 Product Overview

This measurement product is a multi-functional digital multimeter capable of measuring DC and AC voltages, AC currents, and the resistance, and checking the diode and continuity.

## 1.2 Features

### ◆ Compliance with CE marking requirements

The measurement product is designed to comply with the international safety standard (IEC61010) and EMC standards.

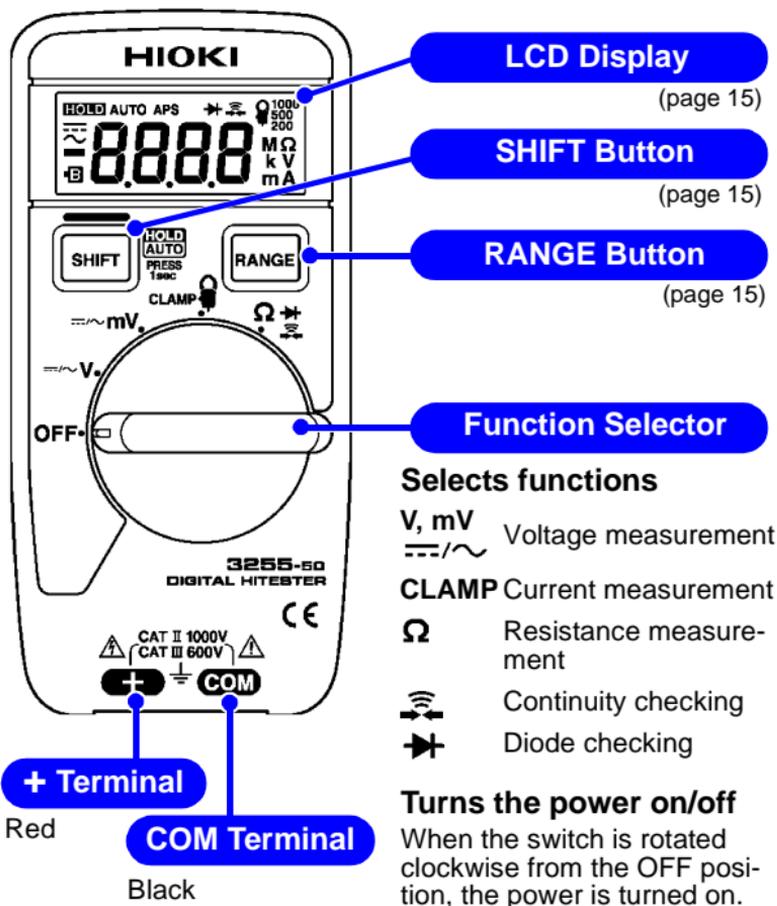
### ◆ Handy and safe digital multimeter (DMM) with protections against accidents

- No need to replace a test lead; two input terminals are provided
- A fuse and protective resistor between input terminals prevent an accident caused by a short circuit.
- The dustproof and waterproof structure prevents dust and moisture from entering the product (IP54).

### ◆ Current measurement (AC) using a Clamp-on probe

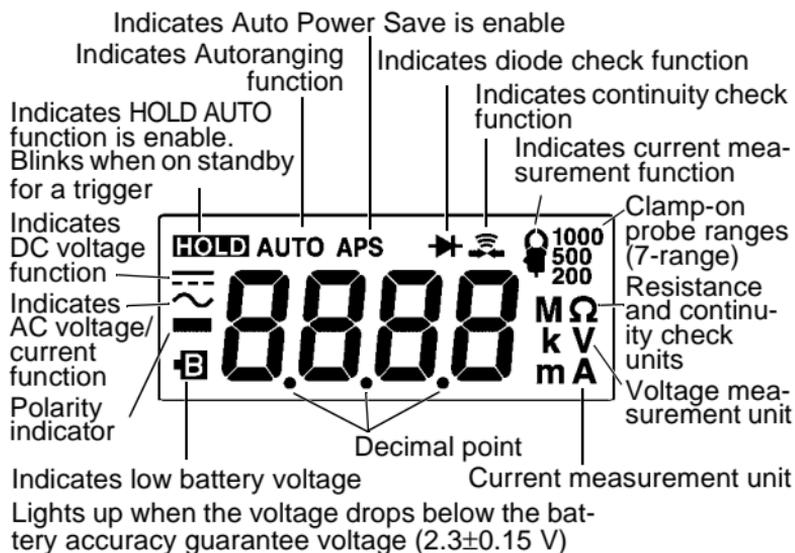
Displays the measured voltage output of an optional Clamp-on probe as a current value using a scaling function.

## 1.3 Parts Names and Functions



Connect the L9207-10 TEST LEAD  
or optional Clamp-on probes.  
Connection method: (page 22)

## LCD Display



## Buttons



### SHIFT button

- Selects DC/AC ( $\equiv$ / $\sim$ ) (Voltage measurement [V,mV])
- Selects function; Continuity check [ $\text{⏏}$ ]/ Diode check [ $\text{▶|}$ ]/ Resistance measurement [ $\Omega$ ]
- Turns the HOLD AUTO function on/off<sup>\*1</sup> (page 35)
- Cancels the Auto Power Save function<sup>\*2</sup> (page 37)  
To reset from the Auto Power Save state, turn off the power and turn it on again.

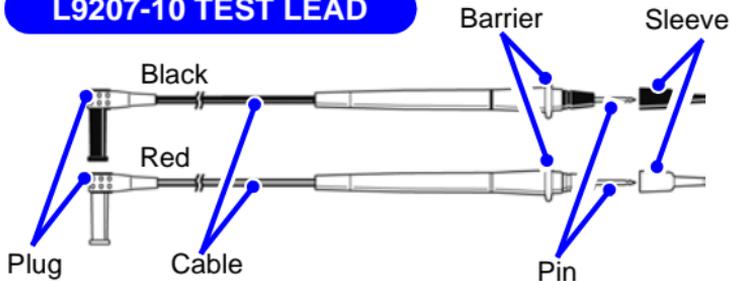
### RANGE button

- Voltage measurement, resistance measurement: Changes the manual range and auto range<sup>\*1</sup>. Selects range (manual range only).
- Current measurement: Selects the range of the Clamp-on probe.

<sup>\*1</sup>: Press the button for at least 1 second.

<sup>\*2</sup>: Turn on the power while pressing the button, and hold the button down until a beeping sound is generated (power-on option).

## L9207-10 TEST LEAD



Pin (Probe tip) (Metal pin)	Connect to the object being tested. Length 4 mm or less (sleeve attached) 19 mm or less (sleeve removed) Diameter $\phi$ approx. 2 mm
Sleeve	Attach to the pins to prevent short circuit accidents.
Barrier	Represents the safe handling distance from the pins.
Cable	Double sheathed cables. Length Approx. 900 mm Diameter $\phi$ approx. 3.6 mm
Plug	Connect to the test terminals on this instrument.

** DANGER**

- 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 and CAT IV measurement categories. Remove the sleeves from the test leads when performing measurements in the CAT II measurement categories. For details on measurement categories, see "Measurement categories" (page 6) in the instruction manual.
- To prevent an electric shock accident, 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.

** CAUTION**

- When performing measurements with the sleeves attached, be careful to avoid damaging the sleeves.
- If the sleeves are inadvertently removed during measurement, be especially careful in handling the test leads to avoid electric shock.

## Removing and attaching the sleeves



The tips of the metal pins are sharp, so take care not to injure yourself.

### Removing the sleeves



Gently hold the bottom of the sleeves and pull the sleeves off. Safely store the removed sleeves so as not to lose them.

### Attaching the sleeves

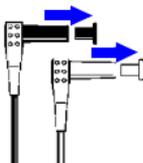


Insert the metal pins of the test leads into the holes of the sleeves, and firmly push them all the way in.

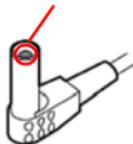
### NOTE

Remove the protective cap installed at the time of shipment before using the instrument. The red plastic inside the plug is provided for protective purposes and should not be removed. It may be difficult to plug in the plug for the first time, but be sure to insert the plug all the way into the outlet before using the instrument (you will get used to the feel of the plug quickly).

### Removing the safety cap



### Protective plastic



# Measurement Procedures

## Chapter 2



Observe the following precautions to avoid electric shock.

- 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.

## 2.1 Pre-Operation Inspection



### Operation Check

If the operation check reveals any abnormalities, stop the check immediately and do not use the instrument.

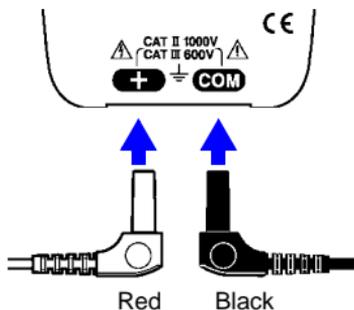
#### Required equipment:

- Model 3255-50 (this instrument)
- Model L9207-10 TEST LEAD
- AC power receptacle (100 V AC 50/60Hz commercial power supply)

- 1.** Set the function switch to "Ω".
- 2.** Press the **SHIFT** key to conduct the continuity check. (  lights.) (page 30)

## 2.1 Pre-Operation Inspection

3. Connect the red test lead to the V terminal, and the black test lead to the COM terminal.

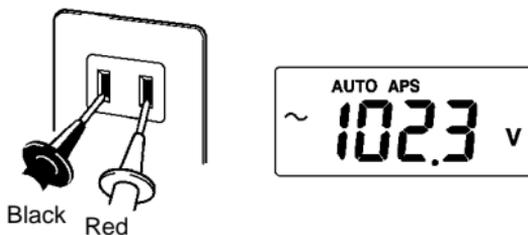


4. Short the tips of the red and black test leads by touching them together.



- Buzzer sounds.
  - Value stabilizes around 0 Ω. → OK
  - **OF** displayed / The display is unstable. → NO Possible test leads or tester malfunction.
5. Set the function switch to "V" to conduct the ACV.  
( ~ lights.)

6. Insert the test lead tips into the openings of the AC receptacle.



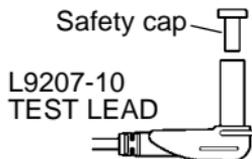
- Display of commercial voltage levels → OK
- No display of commercial voltage levels → NO Possible tester malfunction.

**NOTE** This procedure only partially confirms the operation of this instrument. Periodic calibration is necessary in order to ensure that this instrument operates according to its product specifications.

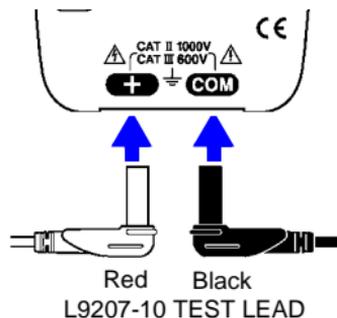
## 2.2 Connection



### Voltage measurement/ Resistance measurement/ Continuity check/ Diode check



1. Remove the protective cap from the test lead supplied with the product.

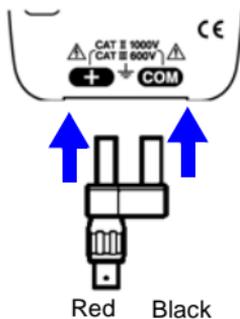


2. Connect the red test lead to terminal +, and the black test lead to terminal **COM**.

**Connect the test lead to the terminals securely.**

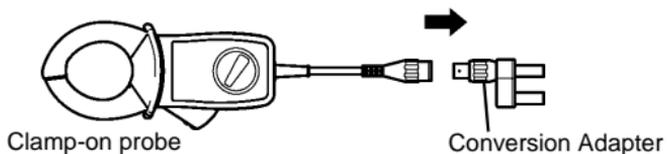
## Current measurement

To perform measurement, an optional Clamp-on probe and Conversion adapter is required.



Connect the red plug of the Conversion adapter to terminal **+**, and the black plug to terminal **COM**.

**Connect the plug to the terminals securely.**



## 2.3 Voltage Measurement

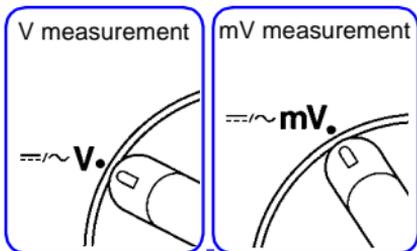


### **⚠ DANGER**

- The maximum input voltage is 1000 VDC, 1000 Vrms(sin), or  $10^7\text{V}\cdot\text{Hz}$ . Attempting to measure voltage in excess of the maximum input could destroy the product and result in personal injury or death.
- The maximum rated voltage between input terminals and the ground is as follows;  
(CAT II) DC 1000 V, AC1000 Vrms (sin) or  $10^7\text{V}\cdot\text{Hz}$   
(CAT III) DC 600 V, AC600 Vrms (sin) or  $10^7\text{V}\cdot\text{Hz}$   
Attempting to measure voltages exceeding this level with respect to ground could damage the product and result in personal injury.
- To avoid electrical shock, be careful to avoid shorting live lines with the test leads.
- For safety, test lead connections must always be made at the secondary side of a circuit breaker.

### **NOTE**

The indicated value may vary due to the existence of induced voltage under no-power conditions. However, this is not a problem.

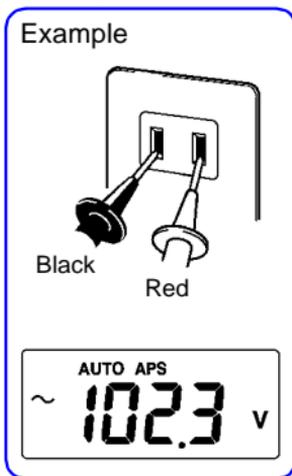


1. Move the function selector to the **V** or **mV** position ("V" or "mV" lights up,  $\sim$  lights up).  
If you are not sure of the approximate voltage level, select V first.

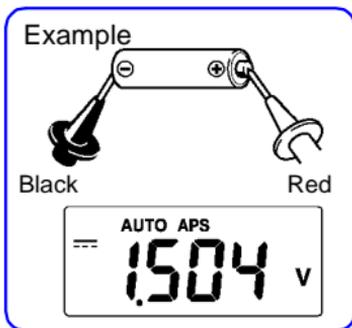
**AC Voltage Measurement**

**DC Voltage Measurement**

2. When DC voltage measurement, press the **SHIFT** button. ( $\overline{\sim}$  lights up)



3. Connect the test leads to the measurement object, and read the indicated value.



Selecting the manual range...

Press **RANGE** ("AUTO" is turned off)

Reselecting the auto range...

Press **RANGE** (for at least 1 second) ("AUTO" lights up)

Holding the measured value (page 35).....

Press **SHIFT** (for at least 1 second) → Measurement → Intermittent sound → Move the test leads away from the measurement object.

Appearance of O.F.....

The measured value exceeds maximum display counts  
420-V range: display up to 4199  
1000-V range: display up to 1099

## 2.4 Current Measurement



To perform measurement, an optional Clamp-on probe and Conversion adapter is required.

### DANGER



Connect the Clamp-on probes to the product first, and then to the active lines to be measured. Observe the following to avoid electric shock and short circuits.

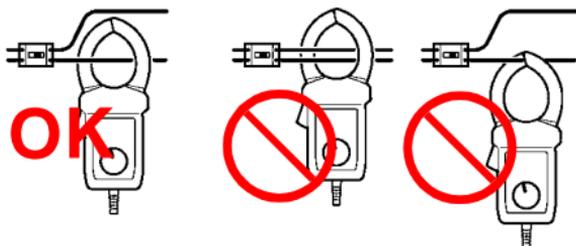
- To avoid short circuits and potentially life-threatening hazards, never attach the Clamp-on probe to a circuit that operates at more than 600 V, or over bare conductors.
- Clamp-on probe should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit 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.
- When the Clamp-on probe is opened, do not allow the metal part of the clamp to touch any exposed metal, or to short between two lines, and do not use over bare conductors.
- Never apply voltage to the Clamp-on probe when a current measurement function is selected. Doing so may damage the product and result in personal injury.

**CAUTION**

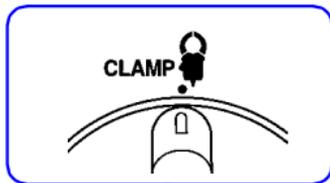
- To prevent damage to the product and sensor, never connect or disconnect a **probe** while the power is on.
- Check the position of the range switch of the Clamp-on probe before taking measurements.

**NOTE**

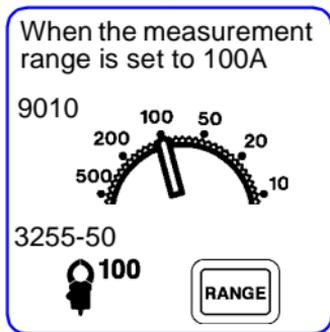
- Make sure the range setting of the product is the same as that of the Clamp-on probe before starting measurement. If the ranges differ, an accurate current measurement will not be displayed.
- Attach the clamp around only one conductor. Single-phase (2-wire) or three-phase (3-wire) cables clamped together will not produce any reading.



- For details on each Clamp-on probe, see the respective Instruction Manual.



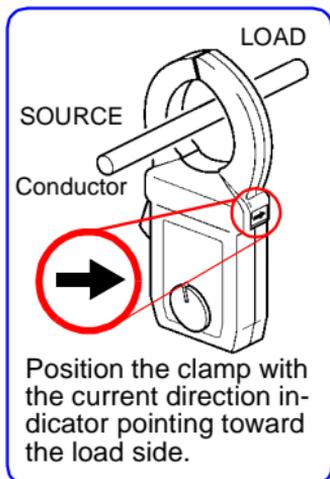
1. Move the function selector to the **CLAMP** position.  
(  lights up)



2. Set the measurement range of the Clamp-on probe (option).

If you are not sure of the level of the current to be measured, select a large range.

3. Press the **RANGE** button and select the same range as that of the Clamp-on probe.  
The Auto Range function is not available for current measurement.



Make sure the range setting of the product is the same as that of the Clamp-on probe before starting measurement.

4. Clamp the measurement object, and read the indicated value.

Change the range in accordance with the actual measurement. If the range of the Clamp-on probe is changed during measurement, change the range of the product as well.

Appearance of O.F .....

The measured value exceeds maximum display counts

10, 100, 1000-A range: display up to 999  
20, 200-A range: display up to 1999  
50, 500-A range: display up to 499

## 2.5 Resistance Measurement

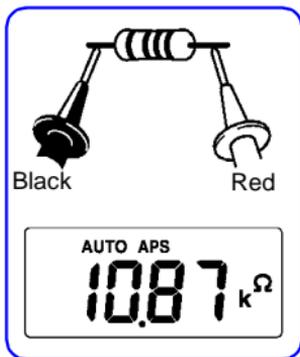


### **⚠ DANGER**

- Never apply voltage to the test leads 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. Move the function selector to the  $\Omega$  position.  
( $\Omega$  lights up)



2. Connect the test leads to the measurement object, and read the indicated value.

Selecting the manual range ..

Press **RANGE** ("AUTO" is turned off)

Reselecting the auto range ...

Press **RANGE** (for at least 1 second)  
("AUTO" lights up)

Holding the measured value (page 35) .....

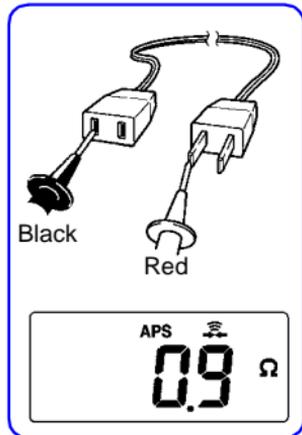
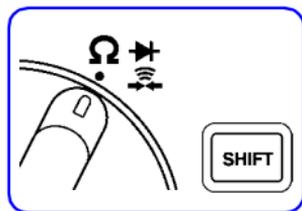
Press **SHIFT** (for at least 1 second) →  
Measurement → Intermittent sound →  
Move the test leads away from the measurement object.

## 2.6 Continuity Check



### **DANGER**

- Never apply voltage to the test leads when the Continuity check 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. Move the function selector to the  $\Omega$  position.
2. Select Continuity check function () using the **SHIFT** button ( lights up).
3. Connect the test leads to the measurement object.

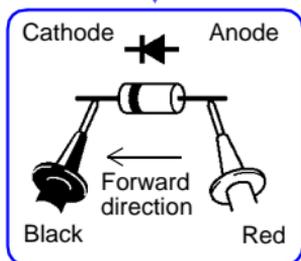
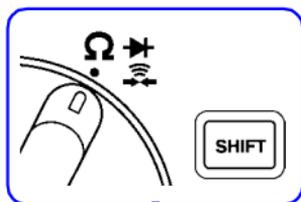
When the continuity (threshold:  $(50 \pm 40 \Omega)$  or less) is established, the beeping sounds and the resistance is displayed (fixed to the 420- $\Omega$  range).

## 2.7 Diode Check



### **⚠ DANGER**

- Never apply voltage to the test leads when the Diode Check 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.



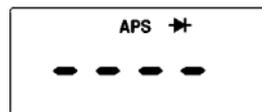
1. Move the function selector to the  $\Omega$  position.
2. Select Diode check function ( $\rightarrow$ ) pressing the **SHIFT** button twice ( $\rightarrow$  lights up).
3. Connect the test leads to the measurement object.

The display shows forward voltage (0.15 V to 2.0 V) for a normal diode.

When the diode is connected in the forward direction (with a beeping sound):



When the diode is invertedly connected or broken:



If displays for both directions are the same, the following may have occurred:

- The diode has malfunctioned.
- The forward voltage of the diode is out of the measurement range.



## Additional Functions

## Chapter 3

### 3.1 Auto Range Function and Manual Range Function

Functions	Auto range function: <b>V/ <math>\Omega</math></b> Manual range function: <b>V/ <math>\Omega</math>/ CLAMP</b>
-----------	---

#### Auto range function \_\_\_\_\_

The Autoranging function automatically selects the optimum measurement range.

Turning on the power also switches Autoranging on (**AUTO** lights up).

The range automatically switches up when the display shows 4200 counts or more, and down when the display shows less than 400 counts. (A beep sound is generated when the 3255-50 is switched to a different range, and decimal point is displayed.)

## Manual range function

---



Press the **RANGE** button to activate the manual range function (**AUTO** is turned off). Only Manual Range is available for current measurement (CLAMP).

### Range selection:

**V/Ω** Each pressing of the **RANGE** button selects the next larger range. After the largest range, pressing the select button again returns you to the smallest range.

**CLAMP** Each pressing of the **RANGE** button selects the next smaller range. After the smallest range, pressing the select button again returns you to the largest range.

### Switching from Manual Range to Auto Range:

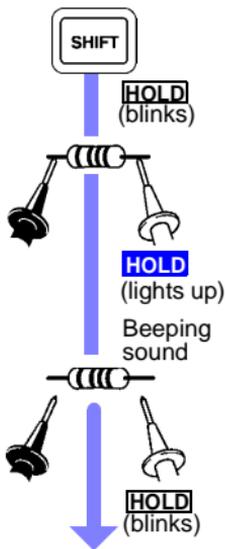
Press and hold down the **RANGE** button (for about 1 second). (**AUTO** lights up)

## 3.2 HOLD AUTO Function

Functions **V/ mV/  $\Omega$**

Description Simply moving the test leads away from the measurement object holds the measured value. This function is useful when it is difficult to read the displayed value in the current location or both hands are being used to conduct the measurement.

(example:  $\Omega$ )



The measured value is held.

1. Move the function selector to the desired position.
2. Press the **SHIFT** button. (**HOLD** blinks)  
In the measurement of resistance, O.F is displayed.
3. Connect the test leads to the measurement object.  
After the measured value is stabilized, an intermittent sound is generated. (**HOLD** lights up)
4. When the intermittent sound is heard, move the test leads away from the measurement object.  
The measured value immediately before the test leads are removed is held. (**HOLD** blinks)

Blind zone **V/ mV**: less than 400 counts  
 **$\Omega$** : 4200 counts or more

Canceling the HOLD AUTO mode:  
Press **SHIFT** again. (**HOLD** is turned off)

## 3.3 Overflow Warning Function

Functions **V/ mV/ CLAMP**

Description When the measured value exceeds the maximum indication (4199 counts), O.F is displayed and an intermittent sound is generated.

O.F is displayed and an intermittent sound is generated also in the cases described below.

	Range	Maximum display value	O.F display
Voltage measurement	1000 V	1099	1100 or more
Current measurement	10/ 100/ 1000 A	999	1000 or more
	20/ 200 A	1999	2000 or more
	50/ 500 A	499	500 or more

Example: When the measured value exceeds 1099 V in the AC voltage measurement ( $\sim$ V)



### NOTE

The Overflow Warning function is disabled while the HOLD AUTO function is on.

## 3.4 Auto Power Save Function

Functions	All functions
Description	Approximately 10 minutes after completing final operation, the measurement product automatically enters Power Save mode. When the measurement product is turned on, it automatically enters Auto Power Save mode ( <b>APS</b> lights up).

### NOTE

- In Power Save mode, the LCD is blank but power is supplied to the measurement product.
- To avoid battery depletion, turn the function selector OFF after use (the Auto Power Save feature consumes a small amount of current).

### **Recovery from Power Save mode:**

Turn off the function selector.

### NOTE

After the measurement product exits Power Save mode, all conditions are reset. If the measurement product is to be used for an extended period, Auto Power Save mode should be canceled in advance.

### **Canceling the Auto Power Save function:**

Turn on the measurement product while pressing the **SHIFT** button. (Hold down the button until the beeping sound is generated.)



The Auto Power Save function is disabled until the measurement product is turned off (APS is turned off).



## Specifications

## Chapter 4

## 4.1 General Specifications

## General

Measurement method	Dual integration
AC measurement system	Average rectifying measurement
Function	DC voltage (—V), AC voltage (～V), AC current (Ⓜ) (using with the optional clamp-on probe), Resistance (Ω), Continuity check (Ⓜ), Diode check (Ⓜ) (judgment only)
Additional function	Auto Range function (AUTO) Manual Range function Hold Auto function (HOLD) Auto Power Save function (APS) Battery-Life Warning function Overflow Warning function (OF)
Circuit protection	Circuit current-limiting resistor Protective fuse [Model 0FLU.440T(ROHS), Rating 0.44 A/1000 V (AC/DC) Fast-Acting, breaking capacity 10 kA (Littelfuse, Inc.)
Display type	TN type LCD, 1/4 duty, dynamic drive
Display elements	3(1/2) dgt. Max. 4199 counts 1000 V AC/DC range 1099 counts Polarity indicator: "-" sign (automatic) Overflow indicator: "OF" or "-OF" Clamp range indicator (10 to 1000)
Units and symbols	～ (AC), — (DC), <b>B</b> , AUTO, HOLD, Ⓜ, Ⓜ, APS, Ⓜ (CLAMP), M, k, m, V, Ω, A
Range switching	Auto/Manual Range
Sampling rate	2.5 S/s

## General

Input terminals	+(V, $\Omega$ , continuity, diode) terminal COM terminal
Functions	OFF/ V/ mV/ CLAMP/ $\Omega$
Buttons	SHIFT, RANGE
Power supply	Two manganese (R03) batteries or two alkaline (LR03) batteries
Battery-life warning	<b>B</b> indicates low battery (2.3 V $\pm$ 0.15 V or less)
Dimensions	Approx. 70W $\times$ 145H $\times$ 31D mm (2.76"W $\times$ 5.71"H $\times$ 1.22"D) (without protrusions)
Mass	Approx. 210 g (7.4 oz) (including batteries)
Operating environment	Indoors, Pollution degree 2, altitude up to 2000 m (6562-ft.)
Operating temperature and humidity	0 to 40°C (32 to 104°F), at 80%RH or less (non-condensating)
Storage temperature and humidity	-20 to 40°C (-4 to 104°F), at 80%RH or less (non-condensating) 40 to 60°C (104 to 140°F), at 70%RH or less (non-condensating)
Accessories	Instruction Manual Two R03 manganese batteries (for monitor) L9207-10 TEST LEAD 9371 CARRYING CASE
Options	9010-50 CLAMP ON PROBE 9018-50 CLAMP ON PROBE 9704 Conversion Adapter (When used in combination with the 9010-50/9018-50)

## Applicable Standards

Safety	EN61010
EMC	EN61326
Dustproof and waterproof	IP54 (EN60529)

## Electrical Characteristics

Measurement accuracy	See accuracy table (page 43)
Accuracy guarantee for temperature and humidity	23°C±5°C (73°F±9°F), 80%RH or less (non-condensating)
Regulated power supply range	3.4 V or lower (until the <b>B</b> mark lights up)
Temperature characteristic	(Measurement accuracy) × 0.1/°C (except 23°C±5°C)
Noise suppression NMRR	DCV: 40dB or better (50/60 Hz) ACV: 40dB or better (DC)
Noise suppression CMRR	DCV: 100dB or better (50/60 Hz) ACV: 60dB or better (50/60 Hz) (1 kΩ Unbalance)
Dielectric strength	Input terminals to case: 7.06 kVrms sin (50/60 Hz for one minute)
Maximum input voltage	1000 VDC/ 1000 Vrms(sin) or 10 <sup>7</sup> V•Hz Measurement Category CAT III 600 V, CAT II 1000 V Anticipated Transient Overvoltage: 6000 V
Maximum rated voltage between input terminals and ground	1000 VDC/ 1000 Vrms(sin) (CAT II) or 10 <sup>7</sup> V•Hz 600 VDC/ 600 Vrms(sin) (CAT III) or 10 <sup>7</sup> V•Hz
Rated power supply voltage	3.0 VDC
Maximum rated power	12 mVA (Max) (supply voltage 3.0 VDC)

## Electrical Characteristics

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Rated power	4 mVA (Typ) (supply voltage 3.0 VDC, in DCV mode)
Power during auto power saving	0.1 mVA (Max) (supply voltage 3.0 VDC, during Auto Power Saving)
Continuous operating time	Approx. 200 hours (in DCV mode, with R03 manganese batteries) Approx. 500 hours (in DCV mode, with LR03 alkaline batteries)

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## 4.2 Accuracy

### Accuracy Table

(Accuracy guaranteed for one year at 23°C±5°C (73°F±9°F), 80%RH or less.)

(rdg.: displayed value, dgt.: resolution)

### Voltage Measurement

	Range [V]	Accuracy ±(rdg.)±(dgt.)	Input Impedance (Frequency range)
--- mV --- V	420.0 m	±1.0%±4	Approx. 10 MΩ
	4.200	±1.0%±4	Approx. 11 MΩ
	42.00	±0.5%±4	Approx. 10 MΩ
	420.0	±0.7%±4	Approx. 10 MΩ
	1000	±0.7%±4	Approx. 10 MΩ
~ mV ~ V	420.0 m	±2.0%±4	(50 to 500 Hz) Approx. 10 MΩ
	4.200	±2.0%±4	Approx. 11 MΩ
	42.00	±1.2%±4	Approx. 10 MΩ
	420.0	±1.5%±4	Approx. 10 MΩ
	1000	±1.5%±4	Approx. 10 MΩ
Overload protection (for one minute): 1000 VDC, 1000 Vrms(sin) or 10 <sup>7</sup> V•Hz			

#### Example accuracy calculation

Measurement range: 420.0 V AC

Accuracy specifications: ±1.5% (rdg.) ±4 (dgt.)

Measured value: 100.0 V

Since the value being measured is 100.0 V,

(A) Reading error (% rdg.): 1.5% of 100.0 V = 1.5 V

(B) Digit error (dgt.): Maximum resolution of 0.1 V, so 4dgt. = 0.4 V

(C) Total error (A+B): 1.9 V

Based on the total error (C), the margin of error for the measured value of 100.0 V is 98.1 V to 101.9 V.

(rdg.: displayed value, dgt.: resolution)

## Current Measurement

(3255-50 only. For accuracy of the combination of the Clamp-on probe and the 3255-50, add the measurement accuracy of the clamp-on probe)

	Range [A]	Accuracy $\pm(\text{rdg.})\pm(\text{dgt.})$	Input Impedance (Frequency range)
<b>CLAMP</b>  (ACA)	10.00	$\pm 2.0\% \pm 4$	Approx. 10 M $\Omega$ (50 to 500 Hz)
	20.00	$\pm 2.0\% \pm 4$	
	50.0	$\pm 2.0\% \pm 4$	
	100.0	$\pm 2.0\% \pm 4$	
	200.0	$\pm 2.0\% \pm 4$	
	500	$\pm 2.0\% \pm 4$	
	1000	$\pm 2.0\% \pm 4$	
Overload protection (for one minute): 1000 VDC, 1000 Vrms(sin) or $10^7 \text{V}\cdot\text{Hz}$			

## Resistance Measurement/ Continuity Check/ Diode Check

	Range [ $\Omega$ ]	Accuracy $\pm(\text{rdg.})\pm(\text{dgt.})$	Open terminal voltage	Notes
 (Resistance)	420.0 4.200 k 42.00 k 420.0 k 4.200 M 42.00 M	$\pm 1.0\% \pm 8$ $\pm 0.7\% \pm 4$ $\pm 1.0\% \pm 4$ $\pm 1.0\% \pm 4$ $\pm 2.0\% \pm 4$ $\pm 5.0\% \pm 4$	3.4 V or less Approx. 0.7 V Approx. 0.5 V Approx. 0.5 V Approx. 0.5 V Approx. 0.5 V	Measurement current: 850 $\mu\text{A}$ max. Varies according to resistance levels to be measured.
 (Continuity)	420.0	$\pm 1.0\% \pm 8$	3.4 V or less	Threshold: (50 $\Omega \pm 40 \Omega$ ) or less
 (Diode)	Judgment only (0.15V to 2.00V)		3.4 V or less	Measurement current: 850 $\mu\text{A}$ max.
Overload protection (for one minute): 1000 VDC, 1000 Vrms(sin) or $10^7 \text{V}\cdot\text{Hz}$				

## 4.3 L9207-10 TEST LEAD Specifications

Operating environment	Indoors, Pollution degree 2, altitude up to 2000 m (6562-ft.)
Operating temperature and humidity	-15°C to 55°C (5°F to 131°F), 90%RH or less (no condensation)
Storage temperature and humidity	-30°C to 60°C (-22°F to 140°F), 90%RH or less (no condensation)
Maximum rated Sleeves attached	Maximum rated voltage to earth 1000 V Measurement category III Anticipated transient overvoltage 8000 V Maximum rated voltage to earth 600 V Measurement category IV Anticipated transient overvoltage 8000 V
Sleeves removed	Maximum rated voltage to earth 1000 V Measurement category II Anticipated transient overvoltage 6000 V
Maximum rated current	10 A
Dielectric strength	AC6.880 kVrms Between metal pins and resin (50 Hz or 60 Hz for 15 seconds)
Dimensions	Cable length Approx. 900 mm (35.43")
Mass	Approx. 65 g (2.3 oz.)
Applicable Standards	EN61010



# Maintenance and Service

## Chapter 5

### 5.1 Replacing the Batteries and Fuses



#### **WARNING**

- To avoid electric shock when replacing the batteries and fuses, first disconnect the test leads from the object to be measured.
- Before using the product after replacing the batteries or fuses, replace the cover and screw.

### Replacing the Batteries

#### **WARNING**

- 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.
- Handle and dispose of batteries in accordance with local regulations.

#### **NOTE**

- The “**B**” indicator appears when battery voltage becomes low. Replace the batteries as soon as possible.
- Use R03 manganese dry cells or LR03 alkaline dry cells.

## Replacing the Fuses



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:

Model 0FLU.440T(ROHS), Rating: 0.44 A/  
1000 V (AC/DC), Breaking capacity:10 kA  
(made by Littelfuse, Inc.)



Be careful not to damage the circuit board or case when changing fuses. If removing the fuse by hand, be careful not to hurt your nails or fingers.

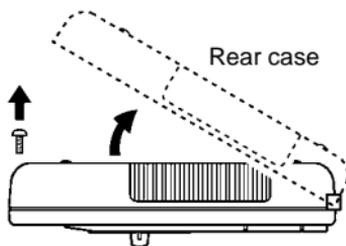


When measurement cannot be performed, the fuse may have blown due to excess current. When the fuse has blown, the beeping sound will not be generated during a continuity check.

### Fuse Protection Circuitry

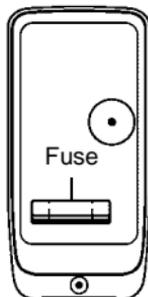
A 5  $\Omega$  protective resistor and 0.44 A safety fuse (1000 V AC/DC, 10 kA cut-off capacity) are installed in series with the positive terminal of the instrument to prevent short-circuit accidents during voltage measurement of power line circuits. If a short occurs in the instrument circuitry, current flow is limited by the protective resistance until the safety fuse opens. The protective resistance limits the short-circuit current, minimizing arcing at the tip of the test probe and providing safer operation.

Necessary tool: Phillips screwdriver



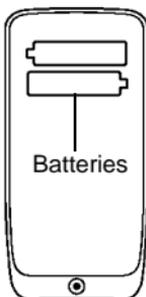
Front case

Front case



Fuse

Rear case



Batteries

1. Disconnect the test leads from the measurement circuit, and make sure the function selector is in the OFF position.
2. Turn the 3255-50 over and use a Phillips screwdriver to remove the one retaining screw.
3. Lift and remove the rear case.
4. Replace the two manganese batteries (R03) mounted to the rear case, or the fuse mounted to the front case.
5. Mount the rear case and tighten the retaining screw.

Fuse type  
Model:0FLU.440T(ROHS)  
Rating:0.44 A/1000 V(AC/DC)  
Breaking capacity:10 kA  
(made by Littelfuse, Inc.)

To purchase, please contact your distributor or nearest Hioki sales office.

## 5.2 Cleaning and Storage

### Cleaning \_\_\_\_\_

**NOTE**

- 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.
- Wipe the LCD gently with a soft, dry cloth.

### Storage \_\_\_\_\_

**NOTE**

To avoid corrosion from battery leakage, remove the batteries from the product if it is to be stored for a long time.

## 5.3 Service

- If the product seems to be malfunctioning, confirm that the batteries are not discharged, and that the test leads, clamp-on probes, and fuse are not open circuited before contacting your dealer or Hioki representative.
- When sending the product for repair, remove the batteries and pack carefully to prevent damage in transit. Include cushioning material so the instrument cannot move within the package. Be sure to include details of the problem. Hioki cannot be responsible for damage that occurs during shipment.





- For regional contact information, please go to our website at <http://www.hioki.com>.
- The Declaration of Conformity for instruments that comply to CE mark requirements may be downloaded from the Hioki website.
- All reasonable care has been taken in the production of this manual, but if you find any points which are unclear or in error, please contact your supplier or the International Sales and Marketing Department at Hioki headquarters.
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