

Instruction Manual

3256-50 3256-51 DIGITAL HITESTER

HIOKI E.E. CORPORATION

June 2012 Revised edition 9 3256C981-09 12-06H



Contents

Inspection Safety N	tionononotes	1 2
Chapte	r 1 Overview	10
1.1	Product Overview	
1.2	Features	
1.3	Parts Names and Functions	11
Chapte	r 2 Measurement Procedures	19
2.1	Pre-Operation Inspection	20
2.2	Voltage Measurement	
2.3	Frequency Measurement	24
2.4	Current Measurement	
2.5	Resistance Measurement	28
2.6	Continuity Check	29
2.7	Diode Check	30
Chapte	r 3 Additional Functions	31
3.1	HOLD AUTO Function	31
3.2	HOLD Function	
3.3	Overflow Warning Function	
3.4	Relative Display Function	
3.5	Auto Power Save Function	36
3.6	Voltage Detecting Function	37
3.7	Dynamic Recording Function	
3.8	Memory Function	

Chapter	4 Specifications	41
4.1	General Specifications	41
4.2	Accuracy	44
4.3	L9207-10 TEST LEAD Specifications	48
Chapter	5 Maintenace and Service	49
5.1	Replacing the Batteries and Fuses	49
5.2	Cleaning	51
5.2 5.3	Cleaning Service	

Introduction

Thank you for purchasing the HIOKI "3256-50/51 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.
- Before using the product the first time, verify that it operates normally to ensure that the 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 and
 probes with the specified Hioki Model L9207-10.

Accessories



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.

A DANGER

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.

Safety Symbols

In the manual, the Λ symbol indicates particularly important information that the user should read before using the product.



The \(\Delta\) 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.



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).

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



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.

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.

Other Symbols



Indicates the quick guide for operations



Indicates the prohibited action

Indicates the reference

Accuracy

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

(maximum display value or scale length)

f.s. The maximum displayable value or the full length of the scale. This is usually the maximum value of the currently selected range.

(reading or displayed value)

rdg. The value currently being measured and indicated on the measuring product.

(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 complies with CATIII (600 V), CATII (1000 V) safety requirements.

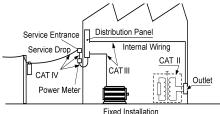
To ensure safe operation of measurement products, IEC 61010 establishes safety standards for various electrical environments. categorized as CAT II to CAT IV, and called measurement cateaories.

> Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools,

- CATIL household appliances, etc.) CAT II covers directly measuring electrical outlet receptacles.
- Primary electrical circuits of heavy equipment (fixed CAT III installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.
- The circuit from the service drop to the service en-CAT IV trance, and to the power meter and primary overcurrent protection device (distribution panel).

Using a measurement product in an environment designated with a higher-numbered category than that for which the product 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

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.

<u>ACAUTION</u>



High temperature, high humidity, dust



Impact, dropping

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.
- This product is not designed to be entirely water- or dust-proof. To avoid damage, do not use it in a wet or dusty environment.
- 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.
- 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 indicator appears when battery voltage becomes low. Replace the batteries as soon as possible.
- 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.

Handling the Cables

A 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.

ACAUTION

- 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.

Overview

Chapter 1

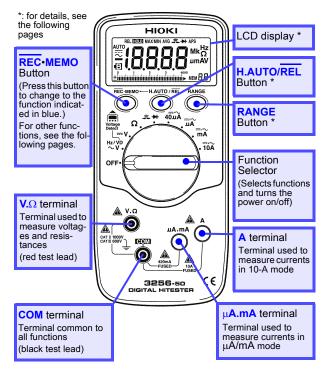
1.1 Product Overview

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

1.2 Features

- Compliance with CE marking requirements The measurement product is designed to comply with the international safety standard (IEC61010-1) and EMC standards.
- Safety-designed handy digital multimeter
 The measurement product is equipped with testlead misinsertion preventive shutters and fast-acting fuses at the current measurement terminals.
- Multi-functional and voltage detecting
 - Live conductors can be examined safely and easily.
 - The Hold Auto function allows measured values to be maintained by simply disconnecting the test leads.
 - The Hold function maintains the displayed value.
 - The Memory function saves the held value displayed.
 - The Recording function displays the maximum, minimum, average, and currently measured values selectively.
 - The Relative function displays any discrepancy from the reference.

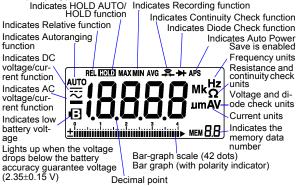
1.3 Parts Names and Functions



NOTE

The terminal shutter works together with the function selector to prevent incorrect operation. Operating the function switch while the test leads are connected may damage the instrument.





REC.MEMO



H.AUTO/REL



HOLD AUTO function (Holds the measured value)

tion indicated in blue Toggles between AC and DC modes(Current measurement) *(page 25)

Recording function (Displays MAX/MIN/ AVG)*1

*(page 38)

off*1

Voltage Detecting (page 37)

Memory Function (page 39)

Cancels the Auto Power Save function *2

*(page 36)

RANGE



(page 31) Turns the HOLD function on/off *2 *(page 32) Turns the Relative function (displaying the relative value) on/

*(page 34)

Changes the manual range and selects range Changes the auto

range from the manual range*1 Changes the input

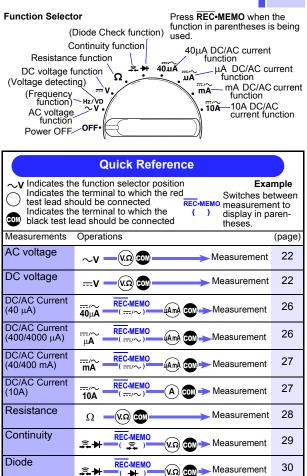
level

(Frequency function) (page 24)

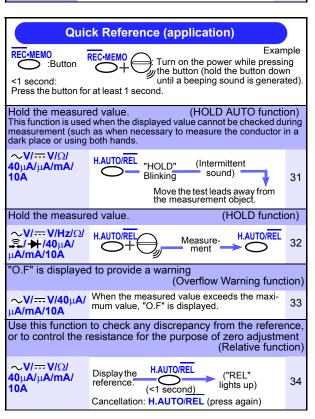
Calls data from memory*2

(page 40)

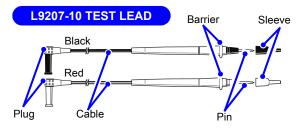
- *1: Press the button for at least 1 second (REC and REL require the button to be pressed for a longer time).
- *2: Turn on the power while pressing the button, and hold the button down until a beeping sound is generated (power-on option).



Frequency	~V REC-MEMO RANGE (1-4) WΩ Measurement	24
Voltage detecting	~V REC-MEMO ×2 RANGE Bring test leads close to the power line.	37



Cancel the Auto-Power Save function. (Auto-Power Save function)				
	(Auto-Power Save function)			
~V/V/Hz/ VD/Ω/-̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄̄͡͡͡͡͡͡͡͡	Press this button until a beeping sound is generated. Enable the Power Save function: OFF Function change ("APS" Power Save mode node node node node node node node n	36		
Check the maximum, minimum, and average values during measurement. (Recording function)				
~V/V/Ω/ 40μΑ/μΑ/mΑ/ 10A	REC-MEMO ("MAX MIN AVG" H.AUTO/REL lights up) (<1 second) (MAX MIN AVG) MAX:maximum value/ MIN:minimum value/ AVG:average value/ MAX MIN AVG: Current value Cancellation: REC-MEMO (press again)	38		
Save the measured value to memory. (Memory function)				
~V/ V/Ω/ 40μΑ/μΑ/mΑ/ 10Α	Hold the displayed value H.AUTO/REL REC•MEMO ("MEM." lights up)	39		
Call the saved data.				
~V/ V/Ω/ 40μΑ/μΑ/mΑ/ 10Α	RANGE + Memory-data RANGE display Select MEM#.	40		
Delete all data from memory.				
~V/ V/Ω/ 40μΑ/μΑ/mΑ/ 10Α	RANGE + REC-MEMO RANGE + Condition (<1 second)	40		



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 ф approx. 3.6 mm
Plug	Connect to the test terminals on this instrument.

A 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.

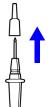
- When performing measurements with the sleeves attached, be careful to avoid damaging the sleeves.
- If the sleeves are inadvertently removed during measurement, be especially careful in handling the test leads to avoid electric shock.

Removing and attaching the sleeves

ACAUTION

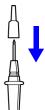
The tips of the metal pins are sharp, so take care not to injure yourself.

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 protective cap

Protective plastic





Measurement Procedures

Chapter 2

A DANGER

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.
- When it is necessary to replace the measurement terminal, remove the test lead from the measurement object and disconnect the lead from the terminal before toggling the function selector.

MARNING

Even when the shutter is closed, the terminals are not sufficiently separated. To avoid electrocution, do not touch the terminals.

NOTE

When the shutter is damaged, discontinue measurement and repair it.

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:

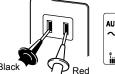
- Model 3256-50/51 (this instrument)
- Model L9207-10 TEST LEAD
- AC power receptacle (100 V AC 50/60Hz commercial power supply)
- 1. Set the function switch to the continuity check(\$\hat{\bar{\bar{\bar{\bar{\approx}}}}}\$).
- Connect the red test lead to the V terminal, and the black test lead to the COM terminal.



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



- Buzzer sounds
- Value stabilizes around 0 Ω . \rightarrow OK
- OF displayed /The display is unstable.→NO Possible test leads or tester malfunction.
- Set the function switch to "V" to conduct the ACV.
 (\sum \text{lights.})
- Insert the test lead tips into the openings of the AC receptacle.





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

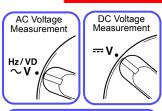
NOTE This procedure only partially confirms the operation of this instrument. Periodic calibration is necessary in order to ensure that this instrument operates according to its product specifications.

2.2 Voltage Measurement

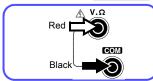


A DANGER

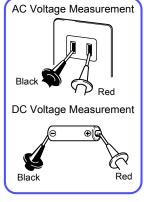
- The maximum input voltage is 1000 VDC, 1000 Vrms, or 10⁷V•Hz.
 - However, for CATIII circuits, the maximum voltage is 600 Vrms. Attempting to measure voltage in excess of the maximum input could destroy the product and result in personal injury or death.
- To avoid electrical shock, be careful to avoid shorting live lines with the test leads.
- For safety, test lead connections must always be made at the secondary side of a circuit breaker.
- The maximum rated voltage between input terminals and ground is 1000 V DC/AC (CATII), 600 V DC/AC(CATIII), or 10⁷V•Hz. Attempting to measure voltages exceeding this limit with respect to ground could damage the product and result in personal injury.



 Move the function selector to the ~V position for AC mode or to the —V position for DC mode (in either case, "V" lights up).



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



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







Selecting the manual range:

Reselecting the auto range:

Holding the measured value:

HOLD AUTO Function, page 31) orHOLD Function, page 32)

Appearance of O.F:

Press RANGE ("AUTO" is turned off) Press RANGE (for at least 1 second) ("AUTO" lights up)

Press **H.AUTO/REL** \rightarrow Measurement \rightarrow Intermittent sound \rightarrow Move the test leads away from the measurement object.

Press H.AUTO/REL+Power-on → Measurement → Press H.AUTO/REL

The measured value exceeds 4200 counts (up to the 420-V range) or 1050 counts (1000-V range).

NOTE

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

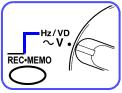
2.3 Frequency Measurement

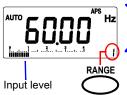


A DANGER

- The maximum input voltage is 1000 VDC, 1000 Vrms, or 10' V•Hz.
 However, for CATIII circuits, the maximum voltage is 600 Vrms. Attempting to measure voltage in excess of the maximum input could destroy the product and result
- For safety, test lead connections must always be made at the secondary side of a circuit breaker.

in personal injury or death.





- Move the function selector to the ~V position and press the REC•MEMO button ("Hz" lights up).
- Connect the red test lead to terminal V.Ω, and the black test lead to terminal COM
- Select the input level (1 to 4) using the RANGE button, in accordance with the input voltage.
 - Connect the test leads to the measurement object, and read the indicated value.

	Input level	Range
1	0.8 to 4 V 4 to 40	4.200V 42.00V
	40 to 400 V 400 to 1000V	420.0V 1000V

Attenuation factor of the input voltage (1/10ⁿ)

(n: Scale number)
Indication range: 0.5 Hz to 500 kHz

Ca me

Canceling the frequency measurement:

Press REC•MEMO



If noise is superimposed on the measurement target, accurate measurement may not be possible.

2.4 Current Measurement



▲ DANGER

- Never apply voltage to the test leads when measurement current function selected. Doing so may damage the product and result in personal injury.
- avoid electrical accidents. power from the circuit before connecting the test leads.

∕!\ WARNING

- To avoid electrical shock, do not use the product to measure current in circuits of 600 V or greater. The current function overload protection trips at 600 Vrms.
- Maximum input current in each range 40μA/μA/mA range: 420mADC/ 420 mA rms 10A range: 10 ADC/ 10 A rms Do not input a current in excess of this value. Otherwise, the measurement product will be damaged, resulting in an accident that may cause injury or death.



Selecting the manual range: Press RANGE

("AUTO" is turned off)

Reselecting the auto range: Press RANGE (for at least 1 sec-

Press H.AUTO/REL → Measure-

Move the test leads away from the

ment \rightarrow Intermittent sound \rightarrow

ond) ("AUTO" lights up)

Holding the measured value:

HOLD AUTO Function, page 31) or

❖HOLD Function, page 32) Press H.AUTO/REL+Power-on →

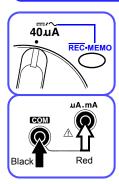
Measurement \rightarrow Press H.AUTO/REL

measurement object.

Appearance of O.F:

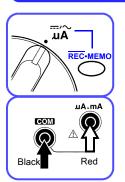
The measured value exceeds 1050 counts(10-A range) or 4200 counts (other ranges).

40μA Measurement (42μA range)



- Move the function selector to the 40μA position.
- 2. Select DC (---) or AC (∼) using the REC•MEMO button.
- Connect the red test lead to terminal μA.mA, and the black test lead to terminal COM.
- Connect the test leads to the measurement object, and read the indicated value.
 The Auto Range function is not provided.

μΑ Measurement (420 μΑ/4200 μΑ range)



- Move the function selector to the μA position.
- 2. Select DC (==) or AC (∼) using the REC•MEMO button.
- Connect the red test lead to terminal μA.mA, and the black test lead to terminal COM.
- Connect the test leads to the measurement object, and read the indicated value.

mA Measurement (40 mA/400 mA)

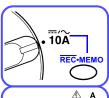


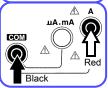
- Move the function selector to the mA position.
- 2. Select DC (==) or AC (∼) using the REC•MEMO button.
- Connect the red test lead to terminal µA.mA, and the black test lead to terminal COM.
- Connect the test leads to the measurement object, and read the indicated value.

A Measurement (10 A range)



Note that the product may be damaged if current exceeding the selected measurement range is applied for a long time (for the 10 A range, continuous current must be limited to 7A, or to less than one minute if over 7A)





- Move the function selector to the 10A position.
- Select DC (→) or AC (→) using the REC•MEMO button.
- Connect the red test lead to terminal A, and the black test lead to terminal COM.
- Connect the test leads to the measurement object, and read the indicated value.
 The Auto Range function is not

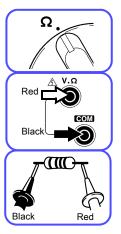
The Auto Range function is not provided.

2.5 Resistance Measurement



▲ DANGER

- Never apply voltage to 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 Ω position.
- 2. Connect the red test lead to terminal $V_{\cdot,\Omega}$ and the black test lead to terminal COM.
- 3. Connect the test leads to the measurement object, and read the indicated value.





Selecting the manual range: RANGE (AUTO is turned off) Reselecting the auto range: RANGE (Press for at least 1 second) ("AÙTO" lights up)

Holding the measured HOLD AUTO Function, page 31) or

H.AUTO/REL→Measurement →Intermittent sound→ Move the test leads away from the measurement object. ♣HOLD Function, page 32) H.AUTO/REL+Power-on→ Mea-

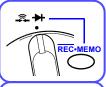
surement →H.AUTO/REL

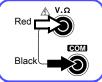
2.6 Continuity Check

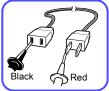


A DANGER

- Never apply voltage to test leads when the Continuity 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.







- 2. Select Diode (\$\hat{\beta}\$) using the REC•MEMO button (\$\hat{\beta}\$ lights up).
- Connect the red test lead to terminal V.Ω, and the black test lead to terminal COM.
- Connect the test leads to the measurement object.

When the continuity (threshold: $(50\pm40~\Omega)$ or less) is established, the beeping sounds and the resistance is displayed (fixed to the $420-\Omega$ range).



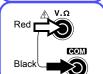
2.7 Diode Check

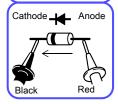


▲ DANGER

- Never apply voltage to 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.







- Move the function selector to the position.
- Select Diode (→) using the REC•MEMO button (→ lights up).
- Connect the red test lead to terminal V.Ω, and the black test lead to terminal COM
- Connect the test leads to the measurement object.

The display shows forward voltage (0.4 V to 0.7 V) for a normal diode.





Appearance of O.F:

The diode is invertedly connected or broken.

Appearance at approxi- The diode is short-circuited. mately 0 V:

Additional Functions

Chapter 3

3.1 HOLD AUTO Function

Functions

 \sim V/==V/ Ω /40 μ A/ μ A/mA/10A

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.

H.AUTO/REL

HOLD (blinks) Measure

HOLD

(lights up) Beeping sound

HOLD (blinks)

The measured value is held.

1. Select the desired function and connect the the measurement product.

- Press the H.AUTO/REL button.
 ("HOLD" blinks) (In the measurement of resistance played.)
- Connect the test leads to the measurement the measured value is stabilized, an intern is generated. ("HOLD" lights up)
- When the intermittent sound is heard, meleads away from the measurement object sured value immediately before the tes removed is held.
 ("HOLD" blinks)

Blind zone \sim V/---V: 420 mV range, less than 400 counts (other range) \sim A/---A: less than 40 counts Ω : O.F.

NOTE HOLD AUTO is disabled in the AC/DC 420-mV range.



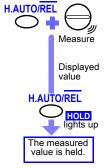
Canceling the hold Press H.AUTO/REL again. mode: (HOLD is turned off)

Saving the data: Press REC•MEMO

3.2 HOLD Function

Functions $\sim V/=V/Hz/\Omega/\frac{2}{3}/+140\mu A/\mu A/mA/10A$

Description This function holds the currently measured value.



- Turn on the power while pressing the H.AUTO/REL button, and hold the button down until a beeping sound is generated (toggle the function selector to the desired position).
- Press the H.AUTO/REL button again at the measured value to be held. The value is held. ("HOLD" lights up)
- 3. To cance the hold mode, press the H.AUTO/REL button again.

NOTE The Hold function is active until the measurement product is turned off.

3.3 Overflow Warning Function

Functions	~V/ V/40μΑ/μΑ/mΑ/10A
Description	When the measured value exceeds the maximum indication (4200 counts), O.F is displayed and an intermittent sound is generated.

When the measured value exceeds 1050 counts in the ranges specified below, O.F is displayed and an intermittent sound is generated.

- Maximum range (1000-V range) of DC voltage measurement (--- V) or AC voltage measurement (~V)
- · 10-A range of current measurement

Example: When the measured value exceeds 1050 counts in the 1000-V range of AC voltage measurement (\sim V)



3.4 Relative Display Function

Functions

 \sim V/==V/ Ω /40 μ A/ μ A/mA/10A

Description

Once an arbitrary value is specified as a reference, the relative value against the reference is displayed. This function is useful to check any discrepancy from the reference.

Checking any discrepancy from the reference (when 10 V is defined as the reference in the voltage measurement)





H.AUTO/REL

The manual range is enabled. for at least 1 second



The bar graph indicates the measured value.



Any discrepancy from the reference (10 V) is displayed. In the case of a negative value, "-" is also displayed.

- Move the function selector to the desired position and connect the test leads to the measurement product. (example: ~V)
- Connect the test leads to the measurement object.
- 3. Press the H.AUTO/REL button for at least 1 second for the value to be defined as the reference.

 (Example: Press the button at 10 V. "REL" lights up and "0000" is displayed.)
- Measure the voltage again and read the displayed value (discrepancy from the reference).

(The measured value minus the reference is displayed.)

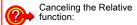
NOTE

The measurement range is <u>fixe</u>d to the range that is active when the <u>H.AUTO/REL</u> button is pressed. If the reference value deviates from the full scale, O.F is displayed. While O.F is displayed, the Relative function is disabled.

Application: Using the Relative Display function for the purpose of zero adjustment in the measurement of low resistances



- Move the function selector to the Ω position and connect the test leads to the equipment.
- Short-circuit the test leads. The resistance of the test leads is displayed.
- Press the H.AUTO/REL button for at least 1 second. ("REL" lights up, "0000")
- Connect the test leads to the measurement object, and read the indicated value.



Press H.AUTO/REL

3.5 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 ("APS" 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. In the current measurement, disconnect the test leads from the terminals and 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 REC-MEMO button. (Hold down the button until the beeping sound is generated.)

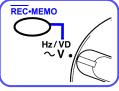
The Auto Power Save function is disabled until the measurement product is turned off (APS is turned off).

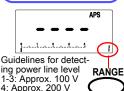
3.6 Voltage Detecting Function

⚠CAUTION

This function should be used for the covered power line. Depending on the measurement status, the power may not be detected. Before using this function, check that the measuring device can detect the existing live power line.

Functions Description This function allows you to check whether the power line is live. If the line is live, the measurement product indicates that fact both audibly (intermittent sound) and visually (display).







- Move the function selector to the <u>v</u> position, and press the <u>REC•MEMO</u> button twice ("1" lights up).
- Bring the measurement product close to the power line.
- If necessary, change the detection range with the RANGE button.

When the line is live, the bar graph fluctuates.

When the voltage is outside of the detection range, an intermittent sound is generated and the display blinks.

The voltage detecting sensor is mounted at the top of the measurement product.

Bring the top close to the power line, as shown at left.

3.7 Dynamic Recording Function

Functions \sim V/==V/ Ω /40 μ A/ μ A/mA/10A

Description

This function allows the maximum (MAX), minimum (MIN), average (AVG), and currently measured values to be displayed selectively. It is useful for measuring any discrepancy over an extended period.



- Select the desired function and connect the test leads to the measurement product.
- 2. Connect the test leads to the measurement object.
- 3. Press the REC•MEMO button for at least 1 second. ("MAX MIN AVG" lights up)
- Select the item using the H.AUTO/REL button.
- The maximum, minimum, and average measured after the activation of the Recording function are automatically recorded (recording interval: approx. 0.4 seconds).
- When the maximum and/or minimum is updated, a beeping sound is generated
- The simple average is displayed within 30 min from the start of measurement and the moving average is displayed after the elapse of 30 min.
- · While the Recording function is in operation, the Auto Power Save function is disabled (APS is turned off). The range is fixed.



Appearance of O.F: The measurement range exceeds the specified level.

> Before using the Recording function, use the manual range to set the range assumed as the maximum level.

Canceling

Press REC•MEMO again.

3.8 Memory Function

Saving data to memory

Functions $\sim V/==V/\Omega/40\mu A/\mu A/m A/10A$

Description This function memorizes the measured value held using the Hold Auto or Hold function.



- Hold the measured value using the Hold Auto or Hold function.
- Press the REC•MEMO button in hold mode. The value displayed is saved in memory of the number specified.

Wait a moment for current value display on the LCD. Up to 20 values can be saved.

Memory numbers cannot be specified. The data is saved to the memory in order, starting from 01. When the memory number reaches 20, the subsequent data sets are overwritten to memory starting from number 01.

Calling data from memory

Call data from memory as specified below.



- 1. Turn on the power while pressing the RANGE button. Move the function selector to the ~V position (hold the button down until a beeping sound is generated).
- 2. Press the RANGE button to select the memory number. The saved data is displayed on the LCD.

Deleting all data from memory

MEM 02

Delete all data from memory as specified below.



Press both buttons simultaneously for at least 1 second.

In Memory Call mode, press the **REC•MEMO** and **RANGE** buttons simultaneously for at least 1 second. All data is deleted from memory.



Data in the memory of the specified number cannot he deleted



normal mea-

Returning to the Toggle the function selector.

(Five minutes after completing final operation, surement mode: the measurement product returns to the normal measurement mode.)

Specifications

Chapter 4

4.1 General Specifications

Measurement Method	Dual integration
AC Measurement System	Average rectifying measurement
Function	DC voltage (V), AC voltage(~V), Resistance (Ω), DC current (A), AC current (~A), Continuity check(♠), Diode check(♣), Frequency (Hz), Voltage detecting
Additional Function	Auto Range function Manual Range function Hold function Hold Auto function Relative Display Function Dynamic Recording function Memory function (Registration, call, deletion) Auto Power Save function Overflow Warning function Battery-Life Warning function
Display Type	TN type LCD, 1/4 duty, dynamic drive
Display Elements	3(1/2) dgt. Max. 4200 counts (19,999 counts for Hz function) Number display: "20" Polarity indicator: "-" sign (automatic) Overflow indicator: "OF" or "-OF"
Units and Symbols	AUTO/REL/HOLD/MAX/MIN/AVG/毫/✦/APS M/k/m/μ/Hz/Ω/A/V/ • / ~//MEM
Bar-graph Indicator	Indication of scale, 42-dot bar graph, and \pm (polarity)

4.1 General Specifications

Input Terminals	$ \begin{array}{ll} V.\Omega \ terminal \ (V,\ Hz,\ \Omega,\ continuity,\ diode) \\ \mu A.mA/\ A/\ COM\ terminals \\ Equipped \ with \ terminal\ shutter\ to\ prevent \\ improper\ operation. \end{array} $
Function Selector	Rotary selector
Range Switching	Auto/Manual Range
Sampling Rate	2.5 S/s (except Frequency), 5 S/s (Frequency), 25 S/s (Update of bar graph)
Power Supply	Two manganese (R03) batteries or two alkaline (LR03) batteries Rated supply voltage: 1.5VDC × 2
Battery-Life Warning	indicates low battery (2.35 V±0.15V or less)
Continuous Operating Time	Approx. 100 hours (V, with R03 manganese batteries) Approx. 200 hours (V, with LR03 alkaline batteries)
Maximum Rated Voltage to Earth	1000VDC/ 1000Vrms(sin), or 10 ⁷ V•Hz(CATII) 600VDC/ 600Vrms(sin), or 10 ⁷ V•Hz(CATIII)
Maximum Input Voltage	CVIVIΩ/Hz DC1000V/AC1000V or 10 ⁷ V·Hz Measurement Category CATII 1000V, CAT III 600V Anticipated Transient Overvoltage: 6000V
Maximum Input Current	~A/== A 42μA - 420mA range: 420 mA DC/AC (fuse 0.5A/700V DC/AC) 10A range:10 A DC/AC (fuse 10A/600V DC/AC)
Dielectric Strength	Input terminals to case: 7.4 kVrms sin (50/60 Hz for one minute)
Noise Suppression	NMRR: V -60dB or better (50/60 Hz) CMRR: V -100dB or better (50/60 Hz) ~V -60dB or better (50/60 Hz)

Maximum Rated Power	20 mVA (supply voltage 3.0 V) 0.1 mVA (Auto Power Saving, supply voltage 3.0 V)
Operating Environment	Indoors, Pollution Degree 2, altitude up to 2000 m (6562-ft.)
Operating Temperature & Humidity	0 to 50°C (32 to 122°F), at 80%RH or less (non-condensating)
Storage Tempera- ture & Humidity	-20 to 60°C (-4 to 140°F), at 70%RH or less (non-condensating)
Temperature Characteristic	(Measurement accuracy) × 0.1/°C (except 23±5°C)
Size & Weight	Approx.76W \times 167H \times 33D mm (2.99"W \times 6.57"H \times 1.30"D) (without protrusions) Approx. 260 g (9.2 oz)
Accessories	L9207-10 TEST LEAD Instruction Manual Two R03 manganese batteries Protective holster(3256-51) or 9378 CARRYING CASE (3256-50)
Applicable Standards	Safety EN61010 EMC EN61326
Options	L9207-10 TEST LEAD 9014 HIGH VOLTAGE PROBE*(30 kVDC) (*no CE marking) 3853 CARRYING CASE (for 3256-51 can be packaged together with the holster.) 9378 CARRYING CASE (Standard item for the 3256-50)
Protective Fuse	10A terminal: TDC600-10A (made by Cooper Bussmann*) Rating 10 A/600 VAC Fast-Acting Breaking capacity: 10 kA/250 VAC, 200 A/600 VAC μAmA terminal:70125 (made by SIBA Inc.) Rating 0.5 A/700 VAC Fast-Acting Breaking capacity: 50 kA *Cooper Industries Inc., Bussmann Division, USA

4.2 Accuracy

Accuracy guarantee for $\,$ 23±5°C(73±9°F), 80%RH or less temperature and hu-

midity

Guaranteed accuracy 1 year period

Regulated power sup- 3

Regulated power sup- 3.4 V or lower (until the B mark ply range lights up)

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

Voltage Measurement

	Range [V]	Accuracy ±(rdg.)±(dgt.)	Input Impedance (Frequency range)
v	420.0 m 4.200 42.00 420.0 1000	±0.5%±2 ±0.5%±2 ±0.5%±2 ±0.5%±2 ±0.5%±2	100 M Ω or more Approx. 11M Ω Approx. 10M Ω Approx. 10M Ω Approx. 10M Ω Approx. 10M Ω
~ ∨ *1	420.0 m 4.200 42.00 420.0 1000	±1.5%±3*2 ±1.2%±3 ±1.2%±3 ±1.2%±3 ±1.2%±6	100M Ω or more (50 to 100 Hz) Approx. 11M Ω (50 to 500 Hz) Approx. 10M Ω (50 to 500 Hz)

Overload protection (for one minute): 1000 VDC,1000 Vrms(sin) or 10⁷V•Hz

- *1: For the input of less than 10% of the full scale, ±2 dgt. is added to the above measurement accuracies.
- *2: The above measurement accuracy for the 420.0 mV range is not defined for inputs of less than 1.0 mV.

Example accuracy calculation

Measurement range: 420.0 V AC

Accuracy specifications: ±1.2% (rdg.) ±3 (dgt.)

Measured value: 100.0 V

Since the value being measured is 100.0 V,

(A) Reading error (% rdg.): 1.2% of 100.0 V = 1.2 V

(B) Digit error (dgt.): Maximum resolution of 0.1 V, so 3 dgt. = 0.3 V (C) Total error (A+B): 1.5 V

Based on the total error (C), the margin of error for the measured value of 100.0 V is 98.5 V to 101.5 V.

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

Frequency Measurement

	Range [Hz]	Accuracy ±(rdg.)±(dgt.)	Input level (Range)	
Hz *1	1999.9 19.999k	±0.02%±1	1: 0.8 to 4 V 2: 4 to 40 V 3: 40 to 400 V 4: 400 to 1000 V	(4.200V) (42.00V) (420.0V) (1000V)

Overload protection (for one minute): 1000 VDC,1000 Vrms(sin)(CAT II),

600 VDC,600 Vrms(sin)(CATIII), or 10⁷V•Hz

*1: Frequencies of less than 0.50 Hz cannot be measured. Maximum input voltage: 1000 Vrms(sin) or 10⁷V•Hz

Resistance Measurement/ Continuity Check/ Diode Check

	Range	Accuracy ±(rdg.)±(dgt.)	Open terminal voltage	Measurement current (max.) (Reference value)
Ω (Resis- tance)	42.00kΩ		3.4 V or less Approx.0.7V Approx.0.5V Approx.0.5V Approx.0.5V Approx.0.5V	700 μΑ 250 μΑ 50 μΑ 5 μΑ 0.5 μΑ 0.05 μΑ

Overload protection (for one minute): 1000 VDC,1000 Vrms(sin) or 10⁷V•Hz

- *1: The measurement range varies depending on the battery voltage level.(2.10 V to 2.90 V)
- *2: A beeping sound is generated when the continuity is established.

Resistance Measurement/ Continuity Check/ Diode Check

	Range	Accuracy ±(rdg.)±(dgt.)	Openterminal voltage	Measurement current (max.) (Reference value)
(Continu- ity)	420.0Ω	±0.7%±4	3.4 V or less	Threshold: $(50\Omega \pm 40\Omega)$ or less (Beep = Continuity)
→ (Diode)	2.00V*1	±5.0%±2	3.4 V or less	700 μΑ

Overload protection (for one minute): 1000 VDC,1000 Vrms(sin) or 10⁷V•Hz

- *1: The measurement range varies depending on the battery voltage level.(2.10 V to 2.90 V)
- *2: A beeping sound is generated when the continuity is established.

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

Current Measurement

	Range [A]	Accuracy ±(rdg.)±(dgt.)	Input Imped (Shunt resist	
A	$\begin{array}{c} 42.00 \mu \\ 420.0 \mu \\ 4200 \mu \\ 42.00 m \\ 420.0 m \\ 10.00 *2 \end{array}$	±1.5%±4 ±1.5%±4 ±1.5%±4 ±1.5%±4 ±1.5%±4 ±1.5%±4	Approx. $10k\Omega$ Approx. 100Ω Approx. 100Ω Approx. 1Ω Approx. 1Ω Approx. 1Ω Approx. 0.01Ω	
∼A *1	$\begin{array}{c} 42.00 \mu \\ 420.0 \mu \\ 4200 \mu \\ 42.00 m \\ 420.0 m \\ 10.00 *2 \end{array}$	±2.5%±5 ±2.5%±5 ±2.5%±5 ±2.5%±5 ±2.5%±5 ±2.5%±5	$\begin{array}{lll} \mbox{Approx. } 10k\Omega & \mbox{Fre} \\ \mbox{Approx. } 100\Omega & \mbox{50} \\ \mbox{Approx. } 100\Omega & \mbox{Approx. } 1\Omega & \mbox{Approx. } 1\Omega & \mbox{Approx. } 0.01\Omega & \mbox$	quency range Hz to 500 Hz

Protective Fuse

42μA to 420mA range: 0.5 A/700 VAC,

Breaking capacity 50 kA

10A range: 10A/600VAC, Breaking capacity 10 kA/250 VAC, 200 A/600 VAC

*1:For the input of less than 10% of the full scale, ±2 dgt is added to the above measurement accuracies.

*2:For the 10-A range, the measurement time is infinite at or below 7 A and within 1 minute for 7 A to 10 A.

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

Maintenace and Service

Chapter 5

5.1 Replacing the Batteries and Fuses

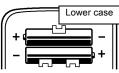


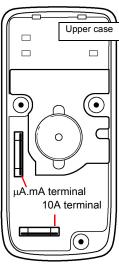
A DANGER

- 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.
- 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.
- 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.

5.1 Replacing the Batteries and Fuses

A fuse is mounted to the µA.mA and A terminals in order to protect the circuit. If the current cannot be measured, the fuse may have blown due to overcurrent. Replace the fuse or battery in accordance with the procedure specified below.





Necessary tool: Phillips screwdriver

- Disconnect the test leads from the measurement circuit, and make sure the function selector is in the OFF position.
 - Position the measurement product with the rear case (bottom face) pointing upward, and use the Phillips screwdriver to remove the three lock bolts.
- 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 three lock bolts.

Fuse type 10A terminal:

TDC600-10A (made by Cooper Bussmann*), Fast-Acting, Rating 10A/600VAC, Breaking capacity 10 kA/250 VAC, 200 A/600 VAC

μAmA terminal:

70125 (made by SIBA Inc.), Fast-Acting, Rating 0.5 A/700 VAC, Breaking capacity 50 kA

*Cooper Industries Inc., Bussmann Division, USA

NOTE

Different fuses are mounted to the μA , mA and A terminals. When replacing a fuse, make sure you are accessing the correct terminal.

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

5.2 Cleaning

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.

5.3 Service

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

5.4 Error Message

The following error message may appear on the instrument due to an internal circuit malfunction. This indicates that the instrument requires repair. Please contact your dealer or nearest HIOKI representative.





HIOKI E.E. CORPORATION

Headquarters

81 Koizumi, Ueda, Nagano 386-1192, Japan TEL +81-268-28-0562 FAX +81-268-28-0568 E-mail: os-com@hioki.co.jp URL http://www.hioki.com/ (International Sales and Marketing Department)

HIOKI USA CORPORATION

6 Corporate Drive, Cranbury, NJ 08512, USA TEL +1-609-409-9109 FAX +1-609-409-9108 E-mail: hioki@hiokiusa.com URL http://www.hiokiusa.com

HIOKI (Shanghai) Sales & Trading Co., Ltd.

1608-1610, Shanghai Times Square Office 93 Huaihai Zhong Road Shanghai, P.R.China POSTCODE: 200021 TEL +86-21-63910090 FAX +86-21-63910360 E-mail: info@hioki.com.cn

TEL +86-21-63910090 FAX +86-21-63910360 E-mail: info@hioki.com.c URL http://www.hioki.cn

HIOKI INDIA PRIVATE LIMITED

Khandela House, 24 Gulmohar Colony Indore 452 018 (M.P.), India TEL +91-731-6548081 FAX +91-731-4020083 E-mail: info@hioki.in URL http://www.hioki.in

HIOKI SINGAPORE PTE. LTD.

33 Ubi Avenue 3, #03-02 Vertex Singapore 408868

TEL +65-6634-7677 FAX +65-6634-7477 E-mail: info@hioki.com.sg

1205

- · 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.
- In the interests of product development, the contents of this manual are subject to revision without prior notice.
- The content of this manual is protected by copyright. No reproduction, duplication or modification of the content is permitted without the authorization of Hioki E.E. Corporation.

Edited and published by Hioki E.E. Corporation

Printed in Japan