

# HIOKI

## 3287

### CLAMP ON AC/DC HITESTER

#### INSTRUCTION MANUAL

June 2001 Revised edition 2 Printed in Japan  
3287A980-02 01-06H

### Introduction

Thank you for purchasing this HIOKI 3287 CLAMP ON AC/DC HITESTER. To get the maximum performance from the unit, please read this manual first, and keep it at hand.

### Inspection

When the unit is delivered, check that it has not been damaged in transit. If the unit is damaged, or fails to operate according to the specifications, contact your dealer or HIOKI representative.

If reshipping the unit, preferably use the original packing.

#### ■ Before Use

- Before using the unit, inspect it and check the operation to make sure that the sheathing on the leads is not damaged and that no bare wire is exposed.
- If there is damage, using the unit could cause electric shock. Contact your dealer or HIOKI representative.

### Accuracy

23°C ± 5°C (73°F ± 9°F) 80% rh or less, no condensation

AC current measurement: true RMS value. DC current measurement: average value

Function	Range	Accuracy + (%rdg. +dgt.)		Max. allowable current
		45 to 66 Hz	10 to 45, 66 to 1 kHz	
ACA (∼A)	10.00 A 100.0 A	±(1.5% +5)	±(2.0% +5)	100 Arms continuous
DCA (---A)	10.00 A 100.0 A	DC	±(1.5% +5)	100 Arms continuous

Effect of conductor position: ±1.0% (in any direction from sensor center)  
Voltage in measured circuit: max. 600 V AC rms (insulated conductor)

AC voltage measurement: true RMS value. DC voltage measurement: average value

Function	Range (Accuracy range)	Accuracy + (%rdg. +dgt.)	Input impedance	Max. allowable voltage
ACV (∼V)	4.200 V (0.420 to 4.200 V) 42.00 V (4.20 to 42.00 V) 420.0 V (42.0 to 420.0 V) 600 V (420 to 600 V)	±(2.3% +8)	11 MΩ ±5% 10 MΩ ±5% 10 MΩ ±5% 10 MΩ ±5%	600 Vrms
DCV (---V)	420.0 mV (42.0 to 420.0 mV) 4.200 V (0.420 to 4.200 V) 42.00 V (4.20 to 42.00 V) 420.0 V (42.0 to 420.0 V) 600 V (420 to 600 V)	±(1.3% +4)	100 MΩ or more 11 MΩ ±5% 10 MΩ ±5% 10 MΩ ±5%	600 V DC

### Resistance

Function	Range (Accuracy range)	Accuracy ± (%rdg. +dgt.)	Open terminal voltage	Overload protection
Ω	420.0 Ω (42.0 to 420.0 Ω) 4.200 kΩ (0.420 to 4.200 kΩ) 42.00 kΩ (4.20 to 42.00 kΩ) 420.0 kΩ (42.0 to 420.0 kΩ) 4.200 MΩ (0.420 to 4.200 MΩ) 42.00 MΩ (4.20 to 42.00 MΩ)	±(2.0% +4) ±(2.0% +4) ±(2.0% +4) ±(2.0% +4) ±(5.0% +4) ±(10.0% +4)	3.4 V or less 0.7 V (typ.) 3.4 V or less 0.47 V (typ.) 3.4 V or less 0.47 V (typ.) 3.4 V or less 0.47 V (typ.) 3.4 V or less 0.47 V (typ.) 3.4 V or less	250 Vrms

### Continuity

Function	Range	Accuracy + (%rdg. +dgt.)	Buzzer	Open terminal voltage	Overload protection
Continuity	420.0 Ω	±(2.0% +6)	50 Ω ↓ 30 Ω	3.4 V or less	250 Vrms

### Safety Symbols

	This symbol is affixed to locations on the equipment where the operator should consult corresponding topics in this manual (which are also marked with the  symbol) before using relevant functions of the equipment.
	In the manual, this symbol indicates explanations which it is particularly important that the user read before using the equipment.
	Indicates a device which is double-insulated.
	Indicates DC (Direct Current).
	Indicates AC (Alternating Current).
	Indicates both DC (Direct Current) and AC (Alternating Current).
	Indicates a grounding terminal.

The following symbols are used in this Instruction Manual to indicate the relative importance of cautions and warnings.

	Indicates that incorrect operation presents extreme danger of accident resulting in death or serious injury to the user.
	Indicates that incorrect operation presents significant danger of accident resulting in death or serious injury to the user.
	Indicates that incorrect operation presents possibility of injury to the user or damage to the equipment.
	Denotes items of advice related to performance of the equipment or to its correct operation.

### Specification

Zero-adjust Function	Before measuring DC current (---), you must perform zero adjustment by simultaneously pressing the  and HOLD keys.
LCD panel	4199 maximum display value
Out of range indication	OF or -OF
Battery low warning	
Data hold indication	<b>HOLD</b>
Zero suppression	5 count or less (current only)
Display update rate	400 ms ↓ 25 ms
Range switching	Auto range / Manual range
Withstand voltage	3.7 kV rms sine wave (for 1 minute) between case and circuit 5.55 kV rms sine wave (for 1 minute) between clamp sensor and case 5.55 kV rms sine wave (for 1 minute) between clamp sensor and circuit

Effect of radiated radio-frequency electromagnetic field (in 3 V/m)	Current measurement: 1.4 A within Voltage measurement: 15 V or less
Crest factor	2.5 (current range: 150A max., voltage range: 1,000 V max.)
Location for use	Altitude up to 2000 m (6562 feet), indoors
Maximum conductor diameter for measurement	35 mm (1.38")
Operating temperature and humidity	0 to 40°C (32°F to 104°F), 80%rh or less (no condensation)
Storage temperature	-10 to 50°C (14°F to 122°F) (no condensation)
Temperature characteristics	In 0 to 40°C range: 0.1 x Measurement accuracy /°C (In 32°F to 104°F range: 0.56 x Measurement accuracy /°F)
Power supply	Rated supply voltage 3 V DC x 1 CR2032 x 1 Lithium battery
Maximum rated power	15 mVA
Continuous operating time	25 hours or more (continuous, no load)
Dimensions and mass	57(W) x 180(H) x 16(D) mm, approx. 170 g 2.24"(W) x 7.09"(H) x 0.63"(D), approx. 6.0 oz.
Accessories	Instruction Manual, 9398 CARRYING CASE, 9208 TEST LEADS
Options	9209 TEST LEADS HOLDER
Standards accuracy	Safety: EN 61010-1:1993+A2:1995 Current measurement (ACA, DCA) Pollution Degree 2 Overvoltage Category (CAT) III (anticipated transient overvoltage 6000 V) Voltage measurement (ACV, DCV) Pollution Degree 2 Overvoltage Category (CAT) II (anticipated transient overvoltage 4000 V) EN 61010-2-031:1994, EN 61010-2-032:1995 UL3111-1:1994, UL3111-2-32:1999, CAN/CSA-C22.2No. 1010.1-92+B-97, CAN/CSA-C22.2No. 1010.2-031-94, CAN/CSA-C22.2No. 1010.2-032-96 EMC: EN 61326-1:1997+A1:1998

### Safety

In order to ensure safe operation and to obtain maximum performance from the unit, observe the cautions listed below.

#### ⚠ DANGER

This equipment is designed to comply with IEC 61010-1 Safety Standards, and has been tested for safety prior to shipment. During high voltage measurement, incorrect measurement procedures could result in injury or death, as well as damage to the equipment. Please read this manual carefully and be sure that you understand its contents before using the equipment. The manufacturer disclaims all responsibility for any accident or injury except that resulting due to a defect in its product.

#### ■ Overvoltage Categories

To ensure safe use of measurement, IEC 60664 establishes safety level standards for different locations, classified as CAT I through CAT IV, and called overvoltage categories. These are defined as follows.

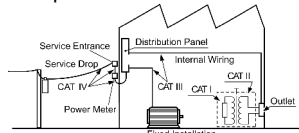
CAT I: Secondary electrical circuits that are connected to a wall outlet through a transformer or similar device.

CAT II: Primary electrical circuits in equipment connected to a wall outlet via a power cord (portable tools, household appliances, etc.)

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

CAT IV: The circuit from the service drop to the service entrance, then to the power meter and to the primary overcurrent protection device.

Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measurement device designed for CAT III environments can endure greater momentary energy than a device designed for CAT II. Use of a lower category product in a higher category environment could result in a severe accident and must be carefully avoided.



### Notes on Operation

#### ⚠ DANGER

- To avoid short circuits and accidents that could result in injury or death, use clamp testers only with power lines carrying 600 V AC or less.
- The maximum rated working voltage is 600 V AC/DC. Do not measure voltage in excess of these limitations, as doing so may damage the unit or cause an accident that might result in injury or death.
- Always connect the clamp sensor or test leads to the secondary side of a breaker. On the secondary side of a breaker, even if the lines are shorted the breaker can trip and prevent an accident. On the primary side, however, the current capacity may be large, and in the event of a short-circuit there may be a serious accident.

#### ⚠ WARNING

- To prevent electric shock, do not allow the unit to become wet and do not use the unit when your hands are wet.
- To avoid electric shock accidents, when carrying out measurement on live lines, wear proper protective gear, including insulating rubber gloves, insulating rubber boots, and safety helmet, and use extreme caution.

#### ⚠ CAUTION

- Do not use or store the unit where it is exposed to direct sunlight, high temperatures, high humidity, or condensation. If exposed to such conditions, the unit may be damaged, the insulation may deteriorate, and the unit may no longer satisfy its specifications.
- Before using the unit, inspect it and check the operation to make sure that the unit was not damaged due to poor storage or transport conditions. If damage is found, contact your dealer or HIOKI representative.
- Before using the unit, make sure that the sheathing on the leads is not damaged and that no bare wire is exposed. If there is damage, using the unit could cause electric shock. Replace the lead with the specified 9208.

**NOTE:** Accurate measurement may be impossible in locations subject to strong external magnetic fields, such as transformers and high-current conductors, or in locations subject to strong external electric fields, such as radio transmission equipment.

### Functions and Display

#### ■ Auto Power Save Function

- This function automatically switches to the power save state when 10 minutes have elapsed since the last operation.
- The auto power save function is activated automatically when the power is turned on.
- To restore from the auto power save state, turn the function switch to the OFF position once.

**NOTE:** The auto power save function cannot be canceled. A minute amount of power continues to flow while in the power save state. If you will not be using the tester for an extended period of time, set the function switch to OFF or remove the battery.

#### ■ Zero-adjust Function

Before measuring DC current (---), you must perform zero adjustment by simultaneously pressing the and HOLD keys while there is no input to the unit. The zero adjustment function compensates for sensor magnetization and changes in current display over time. This function is only effective with measurement of DC current (---).

**NOTE:** Please do not perform zero adjustment while there is any input to the unit. Also note that the zero-adjust function will not function when the display count is greater than 1000.

#### ■ Auto-range Function

When measuring an AC current (∼A), DC current (---A), AC voltage (∼V), DC voltage (---V), or resistance (Ω), the measurement range is automatically set to the most appropriate range.

#### ■ Manual Range Function

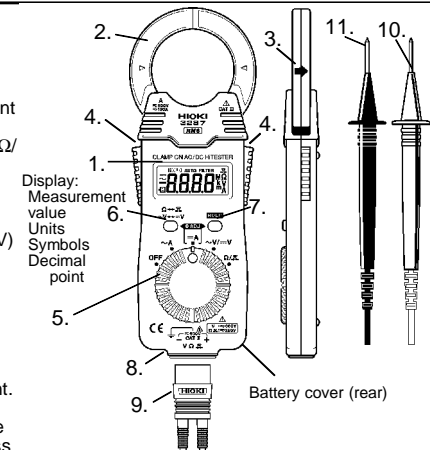
Power on the tester while holding down the key or HOLD key to select a manual range for measuring AC current (∼A), DC current (---A), AC voltage (∼V), DC voltage (---V) or resistance (Ω). Note that this function is not available for continuity testing. Press the key to step to the next range. To switch between AC voltage (∼V) and DC voltage (---V), press and hold the key for at least one second.

#### ■ Overflow indication

When the input exceeds the measurement range, "OF" or "-OF" is displayed.

### Names and Functions of Parts

- Display
- Clamp sensor
- Current direction indicator
- Operation grip
- Function switch  
OFF / AC current (∼A) / DC current (---A) / Voltage (∼/---V) / Resistance and Continuity check (Ω/∞)
- key  
∼ V / --- V key
- Measuring voltage  
Switches between AC voltage (∼V) and DC voltage (---V)
- Measuring resistance or continuity  
Switches between resistance measurement (Ω) and continuity testing (∞)
- Measuring DC current (---A)  
Pressing this key together with HOLD key initiates zero adjustment.
- HOLD key  
Press this to hold the display value (the indication appears). Press once more to cancel the hold function.
- Measuring DC current (---A)  
Pressing this key together with key initiates zero adjustment.
- Connector 9.Plug  
Connect the test lead plug to the connector for voltage measurement, resistance measurement, or continuity testing. Align the slot on the plug with the key in the connector.
- Red test lead (+)
- Black test lead (-)



### Measurement Procedures

#### ⚠ DANGER

- Before taking a measurement, check the position of the function switch. Setting the function incorrectly may damage the unit or cause an accident that might result in injury or death. When changing the function, disconnect the test leads from the object to be measured.
- Do not input a voltage to the resistance measurement function and the continuity test function. Doing so may damage the unit or cause an accident resulting in injury or death.
- At the time as the continuity test, to avoid electrical accidents, turn off the power before measuring a circuit.

**NOTE:** The frequency of a distorted waveform, such as on the secondary side of an inverter, may not be indicated correctly.

#### ⚠ Current Measurement

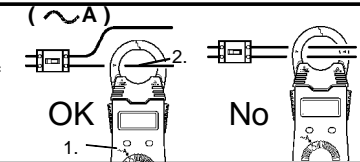
#### ⚠ WARNING

- The maximum permissible input is 100 A. Current measurements exceeding 100 A should be of short duration.
- During current measurement, to avoid an electric shock accident, do not connect the test leads to the unit.

**NOTE:** Clamp the tester on one lead only.

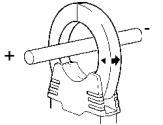
#### Measuring AC Current

- Set the function switch to ∼A.
- Clamp the tester on the conductor, so that the conductor passes through the center of the clamp core.



#### Measuring DC Current

- Set the function switch to ---A.
- After making sure that there is no input to the unit, perform zero adjustment by simultaneously pressing the and HOLD keys.
- Clamp the line to be measured so that the arrow on the side of the clamp sensor points in the direction of current flow and the line is position in the center of the sensor jaws. (A negative reading will result if the arrow points in the opposite direction.)



#### ⚠ Voltage Measurement

#### ⚠ DANGER

- The maximum overvoltage protection input is 600 V AC/DC. When measuring CATIII lines, 300 V rms. Do not measure voltage in excess of these limitations, as doing so may damage the unit or cause an accident that might result in injury or death.

#### ⚠ DANGER

- If the end of a test lead short-circuits lines with a voltage between them, this is very dangerous and can lead to a serious accident. Exercise great care when measuring voltages.
- The maximum rated voltage to ground is 600 V AC/DC. Do not attempt to measure voltages exceeding 600 V with respect to ground. This could result in injury or damage to the unit.

Check that the test lead plug is firmly connected to the tester before beginning measurement.

#### Measuring AC Voltage

- Set the function switch to ∼V/---V.
- Connect the test leads to the object to be measured. When measuring AC voltage, the polarity of the leads can be ignored.

#### Measuring DC Voltage

- Set the function switch to ∼V/---V.
- Press + key to display ---.
- Connect the red (+) lead to the + side of the circuit to be measured and the black (-) lead to the - side. A negative reading will result if the leads are reversed.

#### Resistance Measurement

Plug the test leads into the connector.

- Set the function switch to Ω/∞.
- Connect the test leads to the object to be measured.

#### Continuity Test

Plug the test leads into the connector.

- Set the function switch to Ω/∞.
- Press the key, so that the indication appears.
- Connect the test leads to the object to be measured. Conductivity is good when the buzzer sounds.

### Maintenance

#### ⚠ CAUTION

- If the protective functions of the unit are damaged, either remove the unit from service or post warnings to prevent others from using the unit inadvertently.
- Gently wipe dirt from the surface of the unit with a soft cloth moistened with a small amount of water or mild detergent. Do not try to clean the unit using cleaners containing organic solvents such as benzene, alcohol, acetone, ether, ketones, thinners, or gasoline. They may cause discoloration or damage.
- When not in use for a long time, to prevent possible corrosion caused by battery leakage, remove the battery before storage.
- If the unit is not functioning properly, check the battery and test leads. If a problem is found, contact your dealer or HIOKI representative. Pack the unit carefully so that it will not be damaged during transport, and write a detailed description of the problem. HIOKI cannot bear any responsibility for damage that occurs during shipment.

### Replacing Battery

#### ⚠ WARNING

- If the unit is connected to a line that is to be measured, dangerous voltage levels may be applied to the terminals, and removing the case may expose live components. To avoid electric shock when replacing the battery, first disconnect the unit and the test leads from the object being measured. Also, after replacing the battery, always replace the cover and tighten the screw before using the unit.
- Use only CR2032 lithium battery. Use of any other battery may result in explosion.
- When replacing the battery, be sure to insert it with the polarity correct.
- Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire.
- Keep used batteries out of the reach of children. Dispose of used batteries according to their type in the prescribed manner and in the proper location.

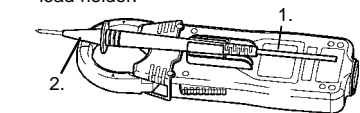
**NOTE:** When the battery is exhausted, the indication appears in the display.

- Remove the unit and the test leads from the test item, and power the unit off.
- Remove the unit from the case, and remove the screws on the battery cover.
- Remove the used battery.
- Being careful about the polarity, insert the new battery of the specified type. (CR2032 lithium battery)
- Replace the battery cover and fasten the screws.

**NOTE:** The battery included with this unit was inserted for TESTING PURPOSES ONLY. Battery life will vary. Please replace the original battery with a new CR2032 lithium battery as soon as it is depleted. CR2032 lithium batteries can be purchased at electronics and appliance stores where specialized batteries are sold.

### Using the 9209 Test Lead Holder (Option)

- Remove the battery cover, and in its place fit the test lead holder (option). Fasten the screws securely.
- Insert the test lead probe into the test lead holder.



## HIOKI

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**HIOKI**

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION  
Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: CLAMP ON AC/DC HITESTER  
Model Number: 3287, 3288  
Product Option: 9209 TEST LEADS

The above mentioned product conforms to the following product specifications:

Safety: EN61010-1:1993+A2:1995  
EN61010-2-031:1994  
EN61010-2-032:1995  
EMC: EN61261-1:1997+A1:1998  
Class B equipment  
Portable test and measurement equipment

Supplementary Information:  
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION  
*Yuji Hioki*  
President

9 March 2000  
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