

Introduction

Thank you for purchasing the HIOKI 3280-20 CLAMP ON HITESTER. To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

Inspection

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

Safety

⚠ DANGER

This instrument 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 instrument. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from instrument defects.

Measurement categories (Overvoltage categories)

The current measurement section conforms to CAT III 600 V safety requirements, and the voltage measurement section conforms to CAT III 300 V, CAT II 600 V requirements. To ensure safe operation of measurement instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called measurement categories. These are defined as follows.

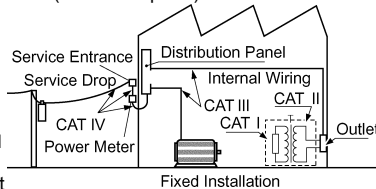
CAT I : Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.

CAT II : Primary electrical circuits in equipment connected to an AC electrical outlet by 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 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).

Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measurement instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II. 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. Never use a CAT I measuring instrument in CAT II, III, or IV environments. The measurement categories comply with the Overvoltage Categories of the IEC60664 Standards.



Safety Symbols

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

	The symbol printed on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the symbol) before using the relevant function. In the manual, the symbol indicates particularly important information that the user should read before using the instrument.
	Indicates a double-insulated device.
	Indicates DC (Direct Current).
	Indicates AC (Alternating Current).
	Indicates both DC (Direct Current) and AC (Alternating Current).
	Indicates a grounding terminal.
	Indicates that the instrument may be connected to or disconnected from a live circuit.

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

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

Notes on Operation

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

⚠ WARNING

- During current measurement, to avoid an electric shock accident, do not connect the test leads to the instrument.
- To avoid electric shock, do not allow the instrument to get wet, and do not use it when your hands are wet.
- Do not attempt to adjust or repair the instrument with the case open and with voltage being input. Such adjustments or repairs should only be made by a technician who fully understands the dangers involved.
- To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.

⚠ CAUTION

- Do not store or use the instrument where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the instrument may be damaged and insulation may deteriorate so that it no longer meets specifications.

Accuracy

23°C±5°C (73°F±9°F), 80%RH or less, no condensation.
Accuracy is guaranteed for input falling within 10% to 100% of each respective range.
AC measurement: True-rms

Function	Range	Accuracy ¹⁾			Max. input current
		40 to 45 Hz ²⁾	45 Hz to 66 Hz ²⁾	66 Hz to 1 kHz ²⁾	
ACA (A)	42.00 A 420.0 A 1000 A	±2.0% rdg. ±5 dgt.	±1.5% rdg. ±5 dgt.	±2.0% rdg. ±5 dgt.	2000 A rms continuous

Effect of conductor position: ±5.0% (in any direction from sensor center)

Maximum rated voltage to earth: CAT III 600 V (Current measurement section)

Function	Range	Accuracy ¹⁾	Input impedance	Max. input voltage
DCV (V)	420.0 mV 4.200 V 42.00 V 420.0 V 600 V	±1.3% rdg. ±4 dgt.	100 MΩ or over 11 MΩ ±5% 10 MΩ ±5% 10 MΩ ±5% 10 MΩ ±5%	600 V DC

Maximum rated voltage to earth: CAT III 300 V, CAT II 600 V (Voltage measurement section)

Function	Range	Accuracy ¹⁾	Open terminal voltage	Overload protection
Continuity []	420.0 Ω	±2.0% rdg. ±6 dgt. (Threshold level 50 Ω±30 Ω)	3.4 V or less	250 V rms

*1: rdg. (reading or displayed value), dgt. (resolution) *2: Frequency range

Specification

LCD panel	4199 maximum display value
Out of range indication	OF or -OF
Battery low warning	
Data hold indication	HOLD
Zero suppression	5 count or less (current measurement only)
Display update rate	FAST 400 ms±25 ms SLOW 3.2 s±0.2 s
Range switching	Auto range / Manual range
Crest factor	2.5 or less (1.5 or less : maximum display value of range)
Withstand voltage	3536 VrmsAC sine wave (for 15 seconds) between case and circuit 5312 VrmsAC sine wave (for 15 seconds) between clamp sensor and case 5312 VrmsAC sine wave (for 15 seconds) between clamp sensor and circuit
Location for use	Altitude up to 2000 m (6562 feet), indoors
Maximum conductor diameter for measurement	φ33 mm (1.30") or less
Temperature and humidity for guaranteed accuracy	0 to 40°C (32°F to 104°F), 80%RH max (no condensation)
Guaranteed accuracy period	1 year, or opening and closing of the Clamp Sensor 10,000 times, whichever comes first
Operating temperature and humidity	0 to 40°C (32°F to 104°F), 80%RH max (no condensation)
Storage temperature	-10 to 50°C (14°F to 122°F) (no condensation)
Temperature characteristics	In 0 to 40°C (32°F to 104°F) range: 0.1 x Measurement accuracy /°C (°F)
Power supply	Rated supply voltage 3 V DC x 1 CR2032 x 1 Lithium battery
Maximum rated power	15 mVA
Continuous operating time	Approx. 50 hours min. (in AC current measurement mode, continuous, no load)
Dimensions and mass	Approx. 57W x 175H x 16D mm, approx. 100 g Approx. 2.24"W x 6.89"H x 0.63"D, approx. 3.5 oz.
Drop proof	One meter to concrete
Accessories	Instruction Manual, 9398 CARRYING CASE, 9208 TEST LEADS
Options	9209 TEST LEADS HOLDER
Applicable standards	Safety: EN61010 Current measurement section: Measurement Category CAT III 600 V Pollution Degree 2 (anticipated transient overvoltage 6000 V) Voltage measurement section: Measurement Category CAT III 300 V, CAT II 600 V Pollution Degree 2 (anticipated transient overvoltage 4000 V) UL61010B CAN/CSA-C22.2No. 1010 EMC: EN61326

Functions and Display

Auto Power Save Function

- This function automatically switches to the power save state when 30 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.

Auto-range Function

When measuring an AC 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

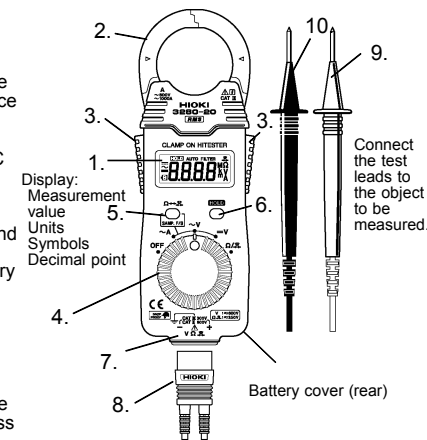
Power on the tester while holding down a key to select a manual range for measuring AC current (A), AC voltage (V), DC voltage (V) or resistance (Ω). Note that this function is not available for continuity testing. Press the Ω ~ SAMP. F/S key to step to the next range.
Powering on with the HOLD key held down: manual ranging, with FAST display update
Powering on with the Ω ~ SAMP. F/S key held down: manual ranging, with SLOW display update

Overflow indication

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

Names and Functions of Parts

- Display
- Clamp sensor
- Operation grip
- Function switch
- OFF / AC current (A) / AC voltage (V) / DC voltage (V) / Resistance and Continuity check (Ω) / SAMP. F/S key
- Measuring AC current or AC or DC voltage
- Switches display update rate (FAST/SLOW). If the display value is fluctuating and hard to read, switch to the slow update (SLOW: approximately every 3 seconds) to stabilize the display.
- Measuring resistance or continuity
- Switches between resistance measurement (Ω) and continuity testing ().
- HOLD key
- Press this to hold the display value (the HOLD indication appears). Press once more to cancel the hold function.
- Connector
- 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

Pre-Operation Inspection (Check the following before using the instrument.)

- The cladding of the test lead shall not be torn, and the metal shall not be exposed. (If damage has occurred, replace with the specified test lead [Model 9208]. Failure to do so may result in electric shock.)
- The clamp sensor or the case shall be free of damage. (If damage has occurred, avoid using the instrument. Use of the instrument under these conditions may result in electric shock.)
- The mating portions of the clamp sensor shall mate properly. The mating portions of the clamp sensor should also be free of any scratches or cracks.
- Battery power should be near full capacity when power is turned on. (If the battery is near exhaustion, the indicator "B" will light up. Using a battery close to exhaustion may result in incorrect measurements.)
- The reading should be around 0 A using the current function when no measurements are being made.
- The reading should be around 0 V using the voltage function while short-circuiting the test lead.
- The reading should be around 0 Ω using the resistance function while short-circuiting the test leads.

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

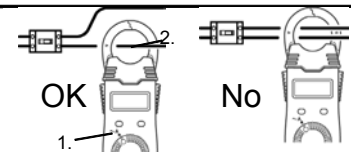
NOTE: Please note that waveforms that include elements outside the frequency characteristic range may not be measured correctly.
Accurate measurement may be impossible in the presence of strong magnetic fields, such as near transformers and high-current conductors, or in the presence of strong electromagnetic fields such as near radio transmitters.

AC Current Measurement (A)

⚠ DANGER

To avoid short circuits and potentially life-threatening hazards, never attach the instrument in current measurement mode to a circuit that operates at more than the maximum rated voltage to earth CAT III 600 V.

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



Voltage Measurement

⚠ DANGER

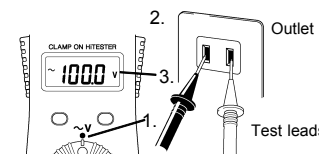
- The maximum input voltage is 600 V AC/DC. Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- To avoid electrical shock, be careful to avoid shorting live lines with the test leads.
- In voltage measurement mode, the maximum rated voltage between input terminals and ground is CAT III 300 V, CAT II 600 V. Attempting to measure voltages exceeding 600 V with respect to ground could damage the instrument and result in personal injury.

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

Measuring AC Voltage (V)

Plug the test leads into the connector.

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

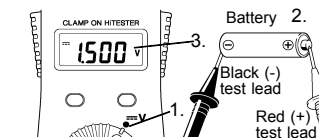


Measuring DC Voltage (V)

Plug the test leads into the connector.

- Set the function switch to V.
- Connect the test leads to the object to be measured.
- Read the display.

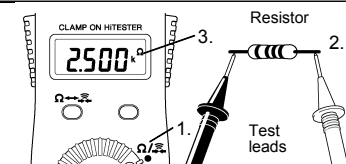
NOTE: Reversing the polarity of the leads displays a negative value.



Resistance Measurement (Ω)

Plug the test leads into the connector.

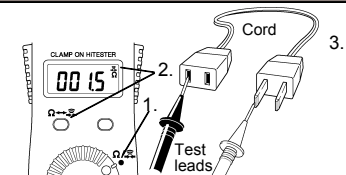
- Set the function switch to Ω.
- Connect the test leads to the object to be measured.
- Read the display.



Continuity Test ()

Plug the test leads into the connector.

- Set the function switch to Ω/ .
- Press the Ω ~ 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 instrument are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- To avoid corrosion from battery leakage, remove the batteries from the instrument if it is to be stored for a long time.
- If the instrument seems to be malfunctioning, confirm that the battery is not discharged, and that the test leads are not open circuited before contacting your dealer or Hioki representative. Pack the instrument carefully so that it will not be damaged during shipment, and include a detailed written description of the problem. Hioki cannot be responsible for damage that occurs during shipment.

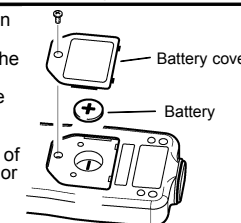
Replacing Battery

⚠ WARNING

- If the instrument 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 test leads from the object being measured. Also, after replacing the battery, always replace the cover and tighten the screw before using the instrument.
- Use only CR2032 (Panasonic or MAXELL) lithium battery. Use of any other battery may result in explosion.
- When replacing the battery, be sure to insert them with the correct polarity. Otherwise, poor performance or damage from battery leakage could result.
- Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire. Handle and dispose of batteries in accordance with local regulations.
- Keep batteries away from children to prevent accidental swallowing.

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

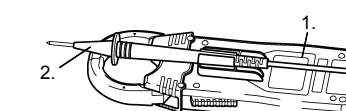
- Remove the test leads from the test item, and power the instrument off.
- Remove the instrument from the case, and remove the screws on the battery cover.
- Remove the used battery.
- Being careful about the polarity, insert the new battery of the specified type. (CR2032 lithium battery; Panasonic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



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

Using the 9209 TEST LEADS HOLDER (Option)

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



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 HITESTER
Model Number: 3280-20
Accessory: 9208 TEST LEADS
The above mentioned products conform to the following product specifications:
Safety: EN61010-1:2001
EN61010-031:2002
EN61010-2-032:2002
EMC: EN61326:1997+A1:1998+A2:2001
+A3:2003
Class B equipment
Portable test, measuring and monitoring equipment used in low-voltage distribution systems
Supplementary Information:
The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.
HIOKI E.E. CORPORATION
Tatsuyoshi Yoshike
President
3280E999-04
15 September 2006

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