

# 3280-20

## CLAMP ON HiTESTER

### Instruction Manual

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# HIOKI

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## Safety

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

### ⚠ DANGER

This instrument is designed to comply with 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. However, using the instrument in a way not described in this manual may negate the provided safety features.

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.

### Safety Symbols

	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the instrument.
	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.
	Indicates that the instrument may be connected to or disconnected from a live circuit.
	Indicates a double-insulated device.
	Indicates a grounding terminal.
	Indicates DC (Direct Current).
	Indicates AC (Alternating Current).
	Indicates both DC (Direct Current) and AC (Alternating Current).

### Symbols for Various Standards

	This symbol indicates that the product conforms to safety regulations set out by the EC Directive.
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The following symbols in this manual indicate the relative importance of cautions and warnings.

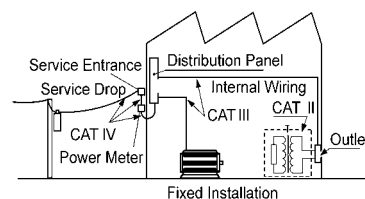
	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a possibility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

### Measurement categories

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

CAT II	Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.) CAT II covers directly measuring electrical outlet receptacles.
CAT III	Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.
CAT IV	The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).

Using a measurement instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided. Use of a measurement instrument that is not CAT-rated in CAT II to CAT IV measurement applications could result in a severe accident, and must be carefully avoided.



## Usage Notes

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

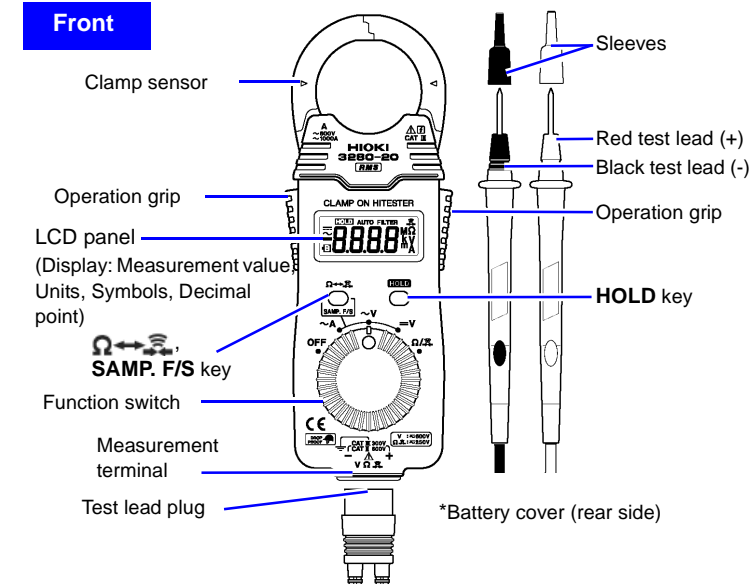
### ⚠ WARNING

- During current measurement, to avoid an electric shock accident, do not connect the test leads to the instrument.
- To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.

Avoid the following locations that could cause an accident or damage to the instrument.

	Exposed to direct sunlight		Exposed to high temperature		In the presence of corrosive or explosive gases
	Exposed to water, oil, other chemicals, or solvents		Exposed to high humidity or condensation		Exposed to strong electromagnetic fields
	Exposed to high levels of particulate dust		Subject to vibration		Near induction heating systems (e.g., high-frequency induction heating systems and IH cooking utensils)

## Names and Functions of Parts



Operation grip	The clamp sensor at the same side as the pushed grip opens.
Function switch	Switching for OFF/AC current [-A] /AC voltage [-V]/DC voltage [=V]/Resistance, Continuity check [Ω/⊘] (Power is turned on in any position other than OFF.)
Test lead plug	Connect the test lead plug to the measurement terminal of the instrument for voltage measurement, resistance measurement or continuity testing.
SAMP. F/S key	<ul style="list-style-type: none"> <li>For any function of [-A], [-V], [=V]: Display update rate (FAST or SLOW) is switchable. If an indicated value fluctuates rapidly and is difficult to read, a slower display update rate is available to make it easier to read the indicated value. (SLOW: about once every three seconds)</li> <li>For [Ω/⊘] function: Resistance [Ω] or Continuity test [⊘] is switchable</li> </ul>
HOLD key	When press HOLD key, <b>HOLD</b> appears in the display and the digital display value is maintained. Press HOLD key again to cancel the data HOLD function.

## Functions and Display

The display is blanked automatically. (Auto Power Save Function)

- The auto power save function is activated automatically when the power is turned on. (Not possible to cancel)
- If no key is pressed for about 30 minutes, the display is blanked automatically. (Power save state)
- To restore from the power save state, turn the function switch to the OFF position once.

The measurement range is automatically set to the most appropriate range. (Auto-range Function)

- Except for continuity test, the measurement range is automatically set to the most appropriate range.
- The "AUTO" indication appears in the display.

A manual range setting becomes available. (Manual Range Function)

- Power on the tester while holding down , SAMP. F/S key or HOLD key, then a manual range setting becomes available except when testing continuity. Either display update rate is selectable by the keys. (, SAMP. F/S key: SLOW, HOLD keys: FAST)
- Press the , SAMP. F/S key to switch the range.
- The "AUTO" indication disappears.

Indication when the input is out of range. (Overflow indication)

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

## Specifications

LCD panel	4199 maximum display value
Out of range indication	OF or -OF
Battery low warning	(during which time accuracy cannot be guaranteed).
Data hold indication	<b>HOLD</b>
Zero suppression	5 count or less (current measurement only)
Display update interval	FAST: 400 ms ±25 ms, SLOW: 3.2 s ±0.2 s
Range switching	Auto range / Manual range
Withstand voltage	Between case and circuit: AC3536 Vrms for 15 sec. Between clamp sensor and case: AC5312 Vrms for 15 sec. Between clamp sensor and circuit: AC5312 Vrms for 15 sec.
Location of use	Altitude up to 2000 m (6562 feet), indoors, Pollution Degree 2
Maximum conductor diameter for measurement	φ33 mm (1.30") or less
Operating temperature and humidity	0 to 40°C (32 to 104°F), 80%RH max (no condensation)
Storage temperature	-10 to 50°C (14 to 122°F) (no condensation)
Temperature characteristics	In 0 to 40°C (32 to 104°F) range: 0.1 x Measurement accuracy / (°C)
Power supply	Lithium battery: CR2032 x 1 (Rated supply voltage 3 V DC)
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, L9208 Test Leads
Maximum rated voltage to earth	Current measurement section: Measurement category CAT III 600 V (anticipated transient overvoltage 6000 V) Voltage measurement section: Measurement Category CAT III 300 V, CAT II 600 V (anticipated transient overvoltage 4000 V)
Applicable standards	Safety :EN61010 EMC :EN61326

## Introduction

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

## Initial 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.

## Overview

This instrument is an AC-specialized clamp ammeter which can measure up to 1000 A and uses the true RMS method to handle distorted waveform measurements.

# Measurement Procedures

## Pre-Operation Inspection

Check the following before using the instrument.

Checkpoints	In case of failures
Isn't the cladding of the test lead torn? Isn't the white or red portion (insulation layer) inside the cable exposed?	When damage is found, replace with the specified new test leads Model L9208. Failure to do so may result in electric shock.
Isn't the clamp sensor or the case damaged?	If damage has occurred, avoid using the instrument. Use of the instrument under these conditions may result in electric shock.
Do the mating portions of the clamp sensor mate properly? Are those portions free of any scratches or cracks?	If the mating portions do not mate properly, accurate measurements cannot be guaranteed. If any scratches or cracks are found, avoid using the instrument. Failure to do so may result in electric shock.
(When power is turned on,) is the battery exhausted?	The "B" lights up when the remaining battery capacity is low. In this case, the instrument's reliability is not guaranteed. Replace the battery immediately.
Is the reading around 0 A using the current function when no measurements are being made?	If not, confirm that the "B" indication does not appear in the display or confirm that the test leads are not disconnected.
Is the reading around 0 V using the voltage function while short-circuiting the test lead?	If no problems for the above, the instrument is possibly being damaged. (See Maintenance and Service)
Is the reading 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 the test leads when the Resistance, Continuity or Diode Check, or Capacitance 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 product should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.

## CAUTION

- 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 measurement category. Remove the sleeves from the test leads when performing measurements in the CAT I and CAT II measurement categories. For details on measurement categories, see "Measurement categories" in the instruction manual.
- 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.
- The tips of the metal pins are sharp, so take care not to injure yourself.

## NOTE

- Some waveforms such as including components other than frequency characteristics (ex. waveforms of inverter and thyristor) cannot be measured.
- Correct 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.

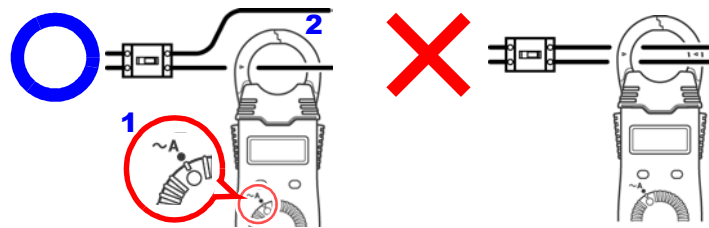
# AC Current Measurement [ ~ A ]



## 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

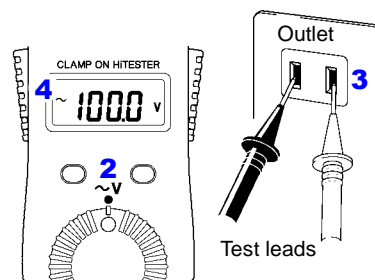
- The maximum input voltage is 600 VDC/AC. Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- To avoid electrical shock, be careful to avoid shorting live lines with the test leads.
- In voltage measurement mode, the maximum rated voltage between input terminals and ground is CATIII 300 V or CATII 600 V. Do not measure voltages exceeding these CATIII 300 V or CATII 600V with respect to ground. The attempt may damage the instrument and result in personal injury.

## NOTE

Make sure that the test lead plug is inserted into the measurement terminal of the instrument correctly.

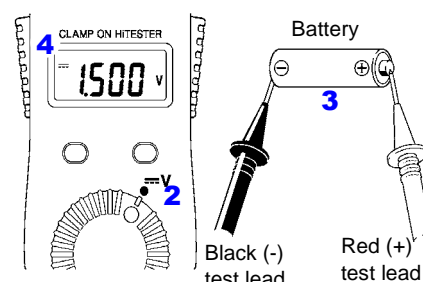
## Measuring AC Voltage [ ~V ]

- Plug the test leads into the measurement terminal.
- 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 measurement terminal.
- Set the function switch to =V.
- Connect the test leads to the object to be measured.
- Read the display.



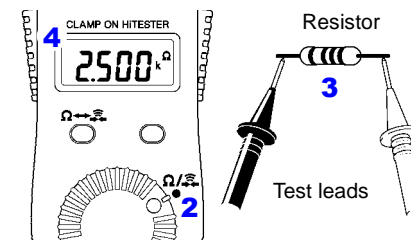
## NOTE

Reversing the polarity of the test leads displays a negative value.

# Resistance Measurement [ Ω ]



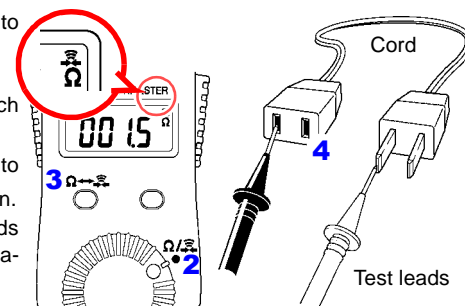
- Plug the test leads into the measurement terminal.
- Set the function switch to Ω/∞.
- Connect the test leads to the object to be measured.
- Read the display.



# Continuity Test [ ]



- Plug the test leads into the measurement terminal.
- Set the function switch to Ω/∞.
- Press the key to display " " indication.
- Connect the test leads to the object to be measured. Conductivity is good when the buzzer sounds.



# Replacing Battery

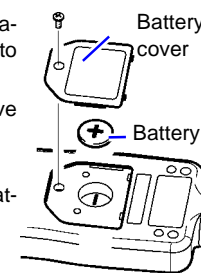
## WARNING

- 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.
- Be careful to observe battery polarity during installation. 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

- The "B" indicator lights up when the remaining battery capacity is low. In this case, the instrument's reliability is not guaranteed. Replace the battery immediately.
- The test battery is built in this instrument. The usable time depends on the battery. When the test battery is exhausted, replace a new battery.
- CR2032 lithium batteries (Panasonic or MAXELL) can be purchased at electronics and appliance stores where specialized batteries are sold.

- Disconnect the test leads from the object to be measured and then switch the function selector to [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.



## CALIFORNIA, USA ONLY

This product contains a CR Coin Lithium Battery which contains Perchlorate Material - special handling may apply. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)

# Accuracy

- Guaranteed accuracy period is 1 year (Opening and closing of the Clamp sensor 10,000 times, whichever comes first).
- Accuracy guarantee for temperature and humidity: 23±5°C (73°F±9°F) and 80% RH or less (no condensation, battery warning indicator is not lighting)
- AC measurement: True-rms

Function	Range (Accuracy range)	Accuracy*1			Max. input current
		40 to 45 Hz*2	45 to 66 Hz*2	66 to 1 kHz*2	
ACA [~A]	42.00 A (4.00 to 41.99 A) 420.0 A (40.0 to 419.9 A) 1000 A (100 to 1000 A)	±2.0%rdg. ±5dgt.	±1.5%rdg. ±5dgt.	±2.0%rdg. ±5dgt.	AC 2000 Arms continuous

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

Function	Range (Accuracy range)	Accuracy*1	Input impedance	Max. input voltage
ACV [~V]	4.200 V (0.400 to 4.199 V) 42.00 V (4.00 to 41.99 V) 420.0 V (40.0 to 419.9 V) 600 V (400 to 600 V)	±2.3%rdg. ±8dgt. (50 to 500 Hz*2)	11 MΩ ±5% 10 MΩ ±5% 10 MΩ ±5%	AC 600 Vrms
DCV [=V]	420.0 mV (40.0 to 419.9 mV) 4.200 V (4.00 to 41.99 V) 42.00 V (40.0 to 419.9 V) 600 V (400 to 600 V)	±1.3%rdg. ±4dgt.	100 MΩ and over 10 MΩ ±5% 10 MΩ ±5%	600 V DC

Function	Range (Accuracy range)	Accuracy*1	Open terminal voltage	Overload protection
Resistance [Ω]	420.0 Ω (40.0 to 419.9 Ω)	±2.0%rdg. ±4dgt.	3.4 V or less	250 V AC/DC
	4.200 kΩ (0.400 to 4.199 kΩ)	±2.0%rdg. ±4dgt.	0.7 Vtyp. 3.4 V or less	
	42.00 kΩ (4.00 to 41.99 kΩ)	±2.0%rdg. ±4dgt.	0.47 Vtyp. 3.4 V or less	
	420.0 kΩ (40.0 to 419.9 kΩ)	±2.0%rdg. ±4dgt.	0.47 Vtyp. 3.4 V or less	
	4.200 MΩ (0.400 to 4.199 MΩ)	±5.0%rdg. ±4dgt.	0.47 Vtyp. 3.4 V or less	
	42.00 MΩ (4.00 to 41.99 MΩ)	±10.0%rdg. ±4dgt.	0.47 Vtyp. 3.4 V or less	

Function	Range	Accuracy*1	Threshold level (beep sound)	Open terminal voltage	Overload protection
Continuity [ ]	420.0 Ω	±2.0%rdg. ±6dgt.	Less than 50 Ω ±40 Ω	3.4 V or less	250 V AC/DC

\*1 rdg.: reading or displayed value, dgt.: resolution

\*2 Frequency range

# Maintenance and Service

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.

# Troubleshooting

