

3280-20

CLAMP ON HiTESTER

Instruction Manual

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HIOKI

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The Declaration of Conformity for instruments that comply to CE mark requirements may be downloaded from the HIOKI website.

Warranty

Warranty malfunctions occurring under conditions of normal use in conformity with the Instruction Manual and Product Precautionary Markings will be repaired free of charge. This warranty is valid for a period of three (3) years from the date of purchase. Please contact the distributor from which you purchased the product for further information on warranty provisions.

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. It can also measure AC voltage, DC voltage, resistance and conduct continuity checks.

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) 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.

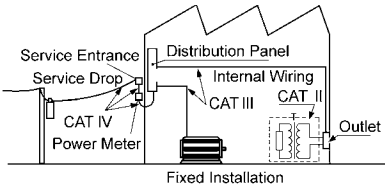
	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a possibility 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 confirms to. CAT III (300 V), CAT II (600 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. Before using the instrument the first time, verify that it operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.

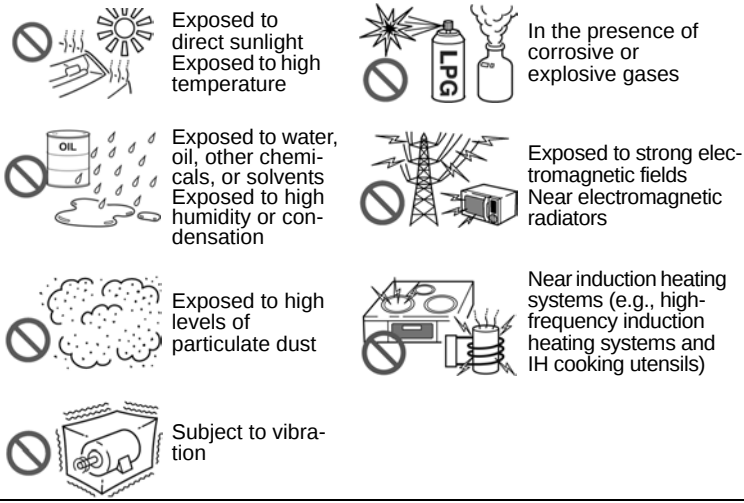
⚠ DANGER

To avoid electric shock, do not touch the portion beyond the protective barrier during use.

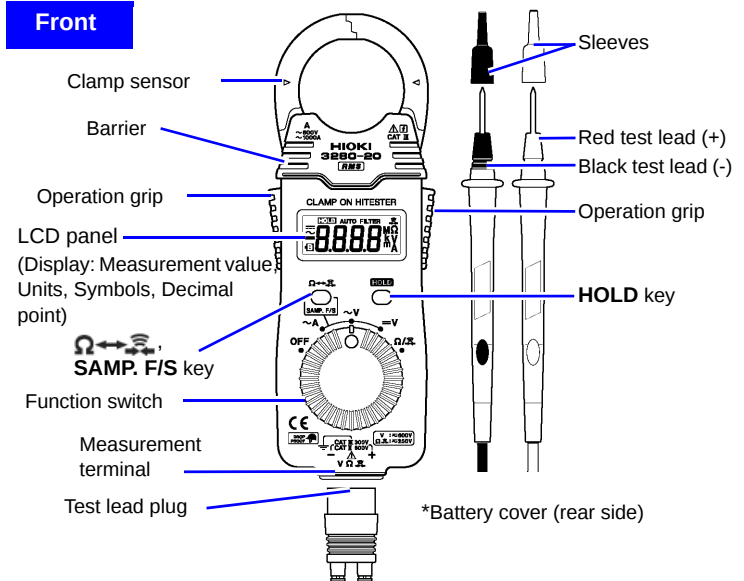
WARNING

- 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.
- Check that there is no damage to the clamp sensor, instrument case, and test leads before using. Do not use if there is any damage as it could lead to electric shock.

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



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	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, unit on the LCD panel flashes at the same time.) For [Ω/⌚] function: Resistance [Ω] or Continuity test [⌚] is switchable
HOLD key	When press HOLD key, HOLD 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	HOLD
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: AC4290 Vrms for 1 min. Between clamp sensor and case: AC7060 Vrms for 1 min. Between clamp sensor and circuit: AC5400 Vrms for 1 min.
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

Measurement Procedures

Pre-Operation Inspection

Check the following before using the instrument.

NOTE

After turning on the instrument and changing over the functions, it could take a dozen seconds to stabilize the display.

Checkpoints	In case of failures
Check whether the cladding of the test lead is not torn and the white or red portion (insulation layer) inside the cable is not exposed.	When damage is found, replace with the specified new test leads Model L9208. Failure to do so may result in electric shock.
Check whether the clamp sensor or the case is free of damage.	If damage has occurred, avoid using the instrument. Use of the instrument under these conditions may result in electric shock.
Make sure that the mating portion of the clamp sensor tip is mate properly.	If the mating portions do not mate properly, accurate measurements cannot guaranteed. Gently wipe off any dirt with a soft cloth found on the surface of the mating portions. If the sensors do not mate properly, repair is necessary.
Make sure there are no missing display of the LCD panel.	If missing, repair is necessary.
Make sure that the display of the LCD panel is not dim or faint.	If the display is dim or faint, the environmental condition may be low temperature (lower than 0°C) or battery may be exhausted. In case of battery exhaustion, replace battery. If the display remains dim even after the battery is replaced, repair is necessary.
Make sure that the battery indicator "B" does not light up when power is turned on.	If the indicator is on, the measurement accuracy cannot be guaranteed. Replace battery immediately.
Check whether the reading is around 0 A when no measurements are being made in current measurement mode.	If not, confirm that the "B" indication does not appear in the display or confirm that the test leads are not disconnected. If no problems for the above, the instrument is possibly being damaged.(See-Troubleshooting)
Check whether the reading is around 0 V while the test leads are short-circuited in voltage measurement mode.	
Check whether the reading is around 0 Ω while the test leads are short-circuited in resistance measurement mode.	

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, or Continuity 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

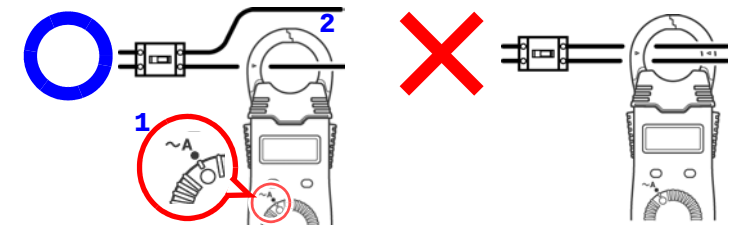
- Removable sleeves are attached to the metal pins at the ends of the test leads. To prevent a short circuit accident, be sure to use the test leads with the sleeves attached when performing measurements in the CAT III measurement category. Remove the sleeves from the test leads when performing measurements in the CAT 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.

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

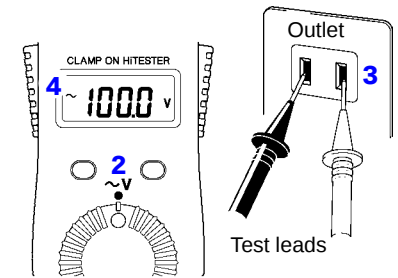
- The maximum input voltage is 600 VDC/AC. Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- To avoid electrical shock, be careful to avoid shorting live lines with the test leads.
- In voltage measurement mode, the maximum 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.

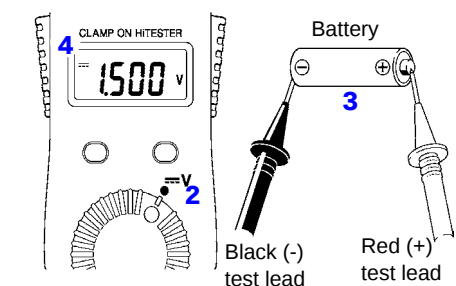
Measuring AC Voltage [~V]

- 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.

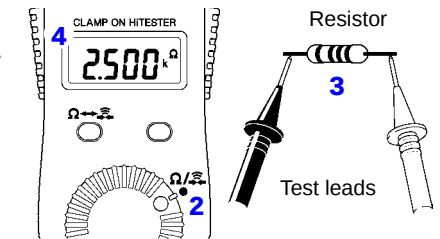


NOTE

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

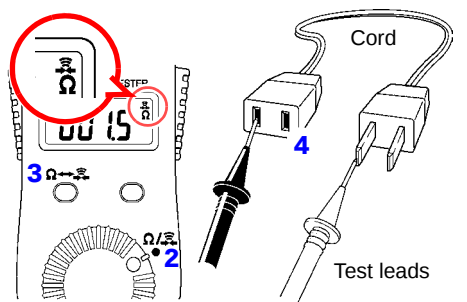
Resistance Measurement [Ω]

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



Replacing Battery

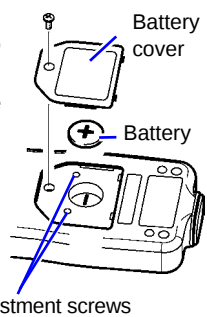
WARNING

- 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.
- Do not turn the adjustment screws as this may disrupt the measurement values.

- 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

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% 10 MΩ ±5%	AC 600 Vrms
DCV [=V]	420.0 mV (40.0 to 419.9 mV) 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)	±1.3%rdg. ±4dgt.	100 MΩ and over 11 MΩ ±5% 10 MΩ ±5% 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

When the instrument is not functioning properly and if you have not performed the pre-operation inspection, please do so now. If you cannot find a problem in the pre-operation inspection, please refer to the following symptoms before contacting your dealer or the nearest Hioki representative. When you send the unit for repair, please 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.

Symptom	Description
The measured value of current or voltage is different from the measured value with other clamp-on tester.	- Waveform containing components out of the frequency property range cannot be measured accurately. - In the case that the sample to be measured is a distorted waveform, the measured value with the 3280-20 and that with another clamp-on tester using MEAN value method (Average value rectified, effective value display) are different. Using true RMS method, the 3280-20 can measure such a waveform accurately. - In the case that the sample to be measured is a waveform with both AC and DC components, half or full-wave rectified waveform, accurate measurement is not be possible due to the large margin of error. We recommend using another instrument with AC+DC mode.
The measured current value is smaller than expected.	The measurement value is not correct, if the measurement is performed leaving the clamp jaws open.
The measured current value is larger than expected. (current value is displayed even with no input.)	Accurate measurement is not possible in the presence of strong magnetic fields, such as transformers and high-current conductors, or in the presence of strong electromagnetic fields such as radio transmitters.