

HIOKI

3280-10F 3280-20F

AC CLAMP METER

Instruction Manual

EN

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HIOKI
HIOKI E.E. CORPORATION

1502EN

- The latest revisions of instruction manuals and manuals in other languages.
- Declarations of Conformity for instruments that comply with CE mark requirements.

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 3280-10F, 3280-20F AC Clamp Meter. To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

3280-10F	Average value measurement RMS conversion model
3280-20F	True RMS measurement model

Safety Notes

This instrument is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, using the instrument in a way not described in this manual may negate the provided safety features. Before using the instrument, be certain to carefully read the following safety notes.

Notation

In this document, the risk seriousness and the hazard levels are classified as follows.

DANGER	Imminent risk of operator death or serious injury
WARNING	Potential for operator death or serious injury
CAUTION	Potential for minor operator injury or device damage or malfunction
	Risk of electric shock
	Prohibited actions
	Actions that must be performed

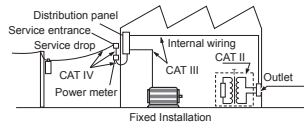
Symbols affixed to the device

	Precaution or hazard (See corresponding topic.)
	Risk of electric shock
	Protected throughout by double insulation or reinforced insulation

	Device may be connected to or disconnected from a live conductor
	Flexible sensors can be connected to or disconnected from live conductors when using appropriate protective insulation. Other sensors can only be connected to or disconnected from insulated conductors suited to the voltage of the conductor under measurement.
	Grounding terminal
	DC (direct current)
	AC (alternating current)

Measurement categories

This instrument's current measurement part conforms to the safety requirements for CAT III 600 V, and the voltage measurement part conforms to the safety requirements for CAT II 600 V, CAT III 300 V measuring instruments.



DANGER

Measuring a location with a higher category number than the measurement category indicated on this device may result in a serious accident such as electric shock.

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

Never apply voltage to the test leads when the resistance and continuity functions are selected.

Doing so may damage the instrument and result in bodily injury. To avoid electrical accidents, remove power from the circuit before measuring.

WARNING

- To avoid electric shock, short circuits and damage to the instrument, disconnect the test leads from the measurement object before switching the rotary switch.
- To prevent electric shock, when measuring the voltage of a power line use a test lead that satisfies the following criteria:
 - Conforms to safety standards IEC61010 or EN61010
 - Of measurement category III or IV
 - Its rated voltage is higher than the voltage to be measured
- The optional test leads for this instrument conform to the safety standard EN61010. Use a test lead in accordance with its defined measurement category and rated voltage.
- Installing the instrument in inappropriate locations may cause a malfunction of instrument or may give rise to an accident. Avoid the following locations:
 - Exposed to direct sunlight or high temperature
 - Exposed to corrosive or combustible gases
 - Exposed to a strong electromagnetic field or electrostatic charge
 - Near induction heating systems (such as high-frequency induction heating systems and IH cooking equipment)
 - Susceptible to vibration
 - Exposed to water, oil, chemicals, or solvents
 - Exposed to high humidity or condensation
 - Exposed to high quantities of dust particles

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WARNING

- Since there is a risk of electric shock, check that the insulation on the test lead and flexible sensor (optional) are neither ripped nor torn, and no metal conductor inside the wire are exposed before using the instrument. If damaged, replace them with those specified by our company.
- 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.
- If the sleeves are inadvertently removed during measurement, stop the measurement.
- With regard to the electricity supply, there are risks of electric shock, heat generation, fire, and arc flash due to short circuits. If persons unfamiliar with electricity measuring instrument are to use the instrument, another person familiar with such instruments must supervise operations.
- This instrument is measured on a live line. To prevent electric shock, use appropriate protective insulation and adhere to applicable laws and regulations.
- Handle and dispose of batteries in accordance with local regulations.

CAUTION

Do not place foreign objects between the jaw tips (or flexible loop couplings) or insert foreign objects into the gaps of the jaws (or flexible loop couplings). Doing so may worsen the performances of the sensor or interfere with clamping action.

- Poor performance or damage from battery leakage could result. Observe the cautions listed below:
 - Do not use batteries after their recommended expiry date.
 - Do not allow weak batteries to remain in the instrument.
 - Replace batteries only with the specified type.
 - Remove the batteries from the instrument if it is to be stored for a long time.

- The indicator lights up when the remaining battery capacity is low. In this case, the instrument's reliability is not guaranteed. Replace the battery immediately.
- To avoid battery depletion, turn the rotary switch OFF after use (the auto power save feature consumes a small amount of current).

Inspection Before Measurement

- Verify that the instrument operates normally to ensure that no damage occurred during storage or shipping.

- (1) Check that the test lead is not broken.
Replace with the specified L9208 Test Lead.
- (2) Check that the resistance measurement and continuity test operates normally.

Have the instrument repaired by the your authorized distributor. The instrument may have been subject to a voltage of greater than 600 V during resistance measurement or continuity testing.

- (3) Check that the battery voltage is not low.
Replace the batteries.

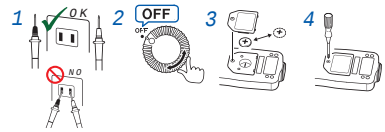
Maintenance/Inspection

Cleaning

- Measurements are degraded by dirt on the mating surfaces of the jaw (or flexible loop coupling), so keep the surfaces clean by gently wiping with a soft, dry cloth.
- To clean the device, wipe it gently with a soft cloth moistened with water or mild detergent.
- Wipe the LCD display gently with a soft, dry cloth.

Insert/Replace Batteries

Necessary tool: Phillips screwdriver and CR2032 Coin-shaped lithium battery



Do not turn the adjustment screw inside the battery case. Doing so will cause the instrument to report abnormal measured values.

Functions

Display will automatically turn off if the instrument is not used for 30 min. (Auto power-saving function)

To resume instrument operation in the previous state, select the "OFF" position with the rotary switch and then move the switch to the desired function.

To cancel auto power-saving function

1. Select the desired function with the rotary switch while holding down key.
2. The LCD display will change from [APS] to [OFF], and the auto power-saving function will be disabled.
3. Setting the rotary switch to "OFF" and then reselecting the desired function will enable the auto power-saving function.

Automatically sets the measurement range to the most appropriate range (Auto-range function)

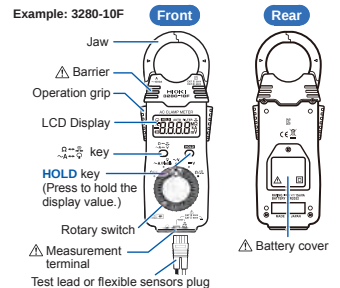
Displays [AUTO]

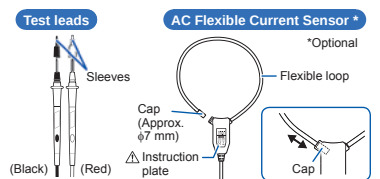
To set the measurement range arbitrarily (Manual-range function)

1. Select the desired function with the rotary switch while holding down key.
2. Press key to switch the range.
(Can set the range as desired, except during continuity testing.)

Indication when input exceeds the measurement range (Overflow indication)
Displays [OF] or [-OF]

Parts Names

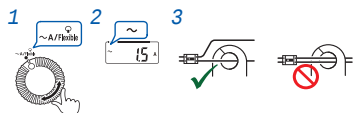




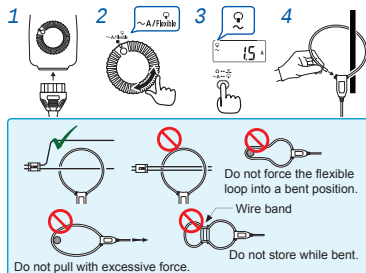
Measurement Methods

AC Current Measurement [$\sim A/Hz$]

Measuring with the instrument

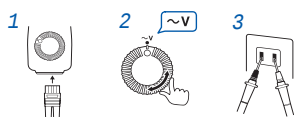


Measuring with Model CT6280 AC Flexible Current Sensor (optional)

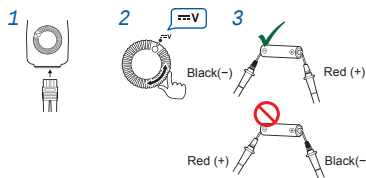


Voltage Measurement

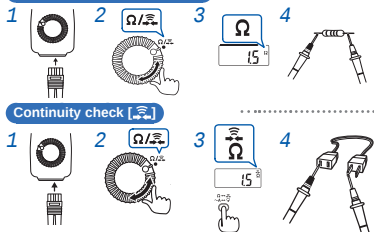
AC Voltage Measurement [$\sim V$]



DC Voltage Measurement [$\equiv V$]



Resistance Measurement [Ω]



Specifications

Accuracy

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

rdg. (reading or displayed value)	The value currently being measured and indicated on the measuring instrument.
dgt. (resolution)	The smallest displayable unit on a digital measuring instrument, i.e., the input value that causes the digital display to show a "1" as the least-significant digit.

Basic Specifications

Maximum input current	- Jaw (3280-10F, 3280-20F) 2000 A AC continuous (45 Hz to 66 Hz) - Flexible loop (3280-10F+CT6280 or 3280-20F+CT6280) 4200 A AC continuous (50 Hz to 60 Hz)
Maximum input voltage	600 V AC/DC and 3×10^4 V-Hz or less (ACV/DCV)
Overload protection	600 V AC/DC (ACV/DCV/ Ω /continuity)
Maximum rated voltage to earth	- Jaw, CT6280 600 V AC (Measurement category III), 300 V AC (Measurement category IV) (Anticipated transient overvoltage: 6000 V) - Voltage measurement terminal 600 V AC (Measurement category II), 300 V AC (Measurement category III) (Anticipated transient overvoltage: 4000 V)
AC measurement method	3280-10F: Average value measurement RMS method 3280-20F: True RMS measurement method
Display update rate	400 ms $\pm$ 25 ms
Noise rejection characteristics	CMRR DCV $\sim$ 40 dB or more (50 Hz/60 Hz) $\sim$ 100 dB or more ACV $\sim$ 60 dB or more (50 Hz/60 Hz, 1 k Ω unbalance) But, $\sim$ 45 dB or more for 600 V range.
Crest factor (3280-20F only)	For 2500 counts or less, 2.5 Reduces linearly to 1.5 or less at 4200 counts
Zero-display range	5 counts (AC Current, jaw - flexible loop)
Effects of conductor position	3280-10F, 3280-20F: within $\pm 5.0\%$ - CT6280: within $\pm 5.0\%$ (At all positions around the sensor's centerpoint reference)
Maximum measurable conductor diameter	3280-10F, 3280-20F: $\phi 33$ mm or less - CT6280: $\phi 130$ mm or less

General Specifications

Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity	- Temperature: -25°C to 65°C (-13.0°F to 149.0°F) (40 MΩ range: up to 40°C) - Humidity (no condensation): Less than 40°C (104.0°F): 80% RH or less - At least 40°C (104.0°F) but less than 45°C (113.0°F): 60% RH or less - At least 45°C (113.0°F) but less than 50°C (122.0°F): 50% RH or less - At least 50°C (122.0°F) but less than 55°C (131.0°F): 40% RH or less - At least 55°C (131.0°F) but less than 60°C (140.0°F): 30% RH or less - At least 60°C (140.0°F) but less than 65°C (149.0°F): 25% RH or less
Storage temperature and humidity	-25°C to 65°C (-13°F to 149°F), 80% RH or less (no condensation)
Dustproof and waterproof	IP40 (EN60529)
Drop-proof distance	1 m on concrete
Standards	Safety: EN61010 EMC: EN61326
Power supply	CR2032 Coin-shaped lithium battery $\times 1$ (3 V DC) Maximum rated power: 15 mVA
Continuous operating time	3280-10F: Approx. 120 hours 3280-20F: Approx. 70 hours (AC current measurement mode, continuous, unloaded)
Dimensions	3280-10F, 3280-20F: Approx. $57\text{W} \times 175\text{H} \times 16\text{D}$ mm ($2.24\text{W} \times 6.89\text{H} \times 0.63\text{D}$) - CT6280: Approx. $42\text{W} \times 65\text{H} \times 18\text{D}$ mm ($1.65\text{W} \times 2.56\text{H} \times 0.71\text{D}$) (excluding the flexible loop and output cable)
Mass	3280-10F, 3280-20F: Approx. 100 g (3.5 oz.) (including battery) - CT6280: Approx. 71 g (2.5 oz.)
Product warranty period	3280-10F, 3280-20F, CT6280: 3 years
Accessories	9398 Carrying Case (C0205 Carrying Case when CT6280 is attached) - L9208 Test lead - CR2032 Coin-shaped lithium battery - Instruction Manual
Options	- CT6280 AC Flexible Current Sensor (Attachment is included) 9209 Test Leads Holder - L4933 Contact Pin Set (Can be connected to the tip of the L9208, which comes with the instrument.) - L4934 Small Alligator Clip Set (Can be connected to the tip of the L9208, which comes with the instrument.)

Function Specifications

Display	Maximum count: 4199 counts
Battery indicator warning voltage	mark lights up at $2.3 \text{ V} \pm 0.15 \text{ V}$ or less

Accuracy Specifications

Conditions of guaranteed accuracy	- Guaranteed accuracy period: 1 year (Number of jaw and flexible loop open/close cycles: 10,000 or less) - Guaranteed accuracy period after adjustment made by Hioki: 1 year - Temperature and humidity for guaranteed accuracy: $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($73.0^{\circ}\text{F} \pm 9.0^{\circ}\text{F}$), 80% RH or less - Temperature characteristic: Measurement accuracy $\times 0.1/^{\circ}\text{C}$ is added (excluding $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$)
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AC Current - Jaw (3280-10F)		
Range	Accuracy range	Accuracy
42.00 A	4.00 A to 41.99 A	$\pm 1.5\%$ rdg. ± 5 dgt.
420.0 A	40.0 A to 419.9 A	
1000 A	100 A to 1000 A	

AC Current - Flexible loop (3280-10F)		
Range	Accuracy range	Accuracy
42.00 A	4.00 A to 41.99 A	$\pm 2.0\%$ rdg. ± 5 dgt.
420.0 A	40.0 A to 419.9 A	$\pm 1.5\%$ rdg. ± 5 dgt.
1000 A	100 A to 1000 A	$\pm 2.0\%$ rdg. ± 5 dgt.

AC Current - Flexible loop (3280-20F)		
Range	Accuracy range	Accuracy
42.00 A	4.00 A to 41.99 A	$\pm 3.0\%$ rdg. ± 5 dgt.
420.0 A	40.0 A to 419.9 A	$\pm 2.0\%$ rdg. ± 5 dgt.
1000 A	100 A to 1000 A	$\pm 3.0\%$ rdg. ± 5 dgt.

AC Voltage		
Range	Accuracy range	Accuracy
42.00 V	4.00 V to 41.99 V	$\pm 1.8\%$ rdg. ± 7 dgt.
420.0 V	40.0 V to 419.9 V	$\pm 1.0\%$ rdg. ± 3 dgt.
600 V	400 V to 600 V	$\pm 1.0\%$ rdg. ± 3 dgt.

DC Voltage		
Range	Accuracy range	Accuracy
42.00 V	4.00 V to 41.99 V	$\pm 1.8\%$ rdg. ± 7 dgt.
420.0 V	40.0 V to 419.9 V	$\pm 1.0\%$ rdg. ± 3 dgt.
600 V	400 V to 600 V	$\pm 1.0\%$ rdg. ± 3 dgt.

Resistance		
Range	Accuracy range	Accuracy
42.00 Ω	4.00 Ω to 41.99 Ω	$\pm 2.0\%$ rdg. ± 4 dgt.
420.0 Ω	40.0 Ω to 419.9 Ω	$\pm 2.0\%$ rdg. ± 4 dgt.
42.00 k Ω	4.00 k Ω to 41.99 k Ω	$\pm 2.0\%$ rdg. ± 4 dgt.
420.0 k Ω	40.0 k Ω to 419.9 k Ω	$\pm 2.0\%$ rdg. ± 4 dgt.
42.00 M Ω	4.00 M Ω to 41.99 M Ω	$\pm 2.0\%$ rdg. ± 4 dgt.
420.0 M Ω	40.0 M Ω to 419.9 M Ω	$\pm 2.0\%$ rdg. ± 4 dgt.

Continuity Check		
Range	Accuracy	Threshold of buzzer sound
42.00 Ω	$\pm 2.0\%$ rdg. ± 4 dgt.	50 Ω ± 40 Ω or less

Open circuit voltage		
Range	Accuracy	Open circuit voltage
42.00 Ω	$\pm 2.0\%$ rdg. ± 4 dgt.	3.4 V or less