

**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.

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

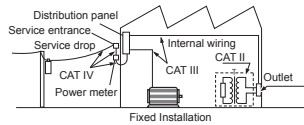
### Symbols affixed to the device

	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

- Installing the instrument in inappropriate locations may cause a malfunction of instrument or may give rise to an accident. Avoid the following locations:
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  - Susceptible to vibration
  - Exposed to water, oil, chemicals, or solvents
  - Exposed to high humidity or condensation
  - Exposed to high quantities of dust particles

### ⚠ 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.

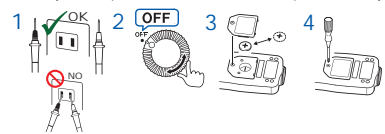
### Maintenance/Inspection

#### 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)

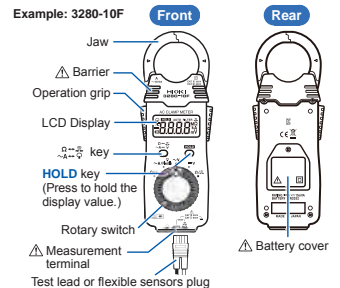
Displays [AUTO]

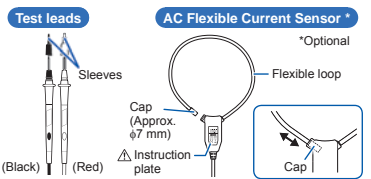
To set the measurement range arbitrarily (Manual-range function)

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

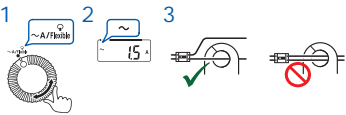




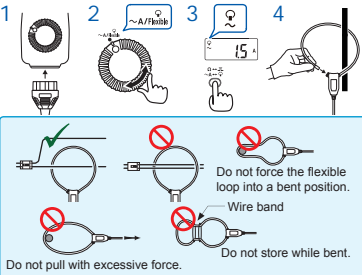
### Measurement Methods

#### AC Current Measurement [ $\sim A / \text{mA}$ ]

##### Measuring with the instrument

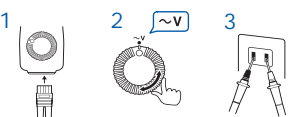


##### Measuring with Model CT6280 AC Flexible Current Sensor (optional)

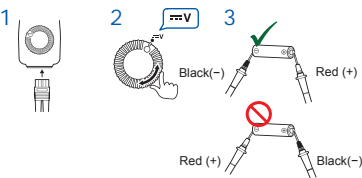


#### Voltage Measurement

##### AC Voltage Measurement [ $\sim V$ ]



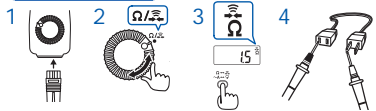
##### DC Voltage Measurement [ $\text{DC} V$ ]



#### Resistance Measurement [ $\Omega$ ]



#### Continuity check [ $\text{diode}$ ]



### Specifications

#### Accuracy

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

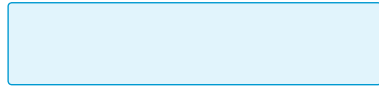
<b>rdg. (reading or displayed value)</b>	The value currently being measured and indicated on the measuring instrument.
<b>dgt. (resolution)</b>	The smallest displayable unit on a digital measuring instrument, i.e., the input value that causes the digital display to show a "1" as the least-significant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

#### Basic Specifications

<b>Maximum input current</b>	<ul style="list-style-type: none"> <li>Jaw (3280-10F, 3280-20F): 2000 A AC continuous (45 Hz to 66 Hz)</li> <li>Flexible loop (3280-10F+CT6280 or 3280-20F+CT6280): 4200 A AC continuous (50 Hz to 60 Hz)</li> </ul>
<b>Maximum input voltage</b>	600 V AC/DC and $3 \times 10^3$ V-Hz or less (ACV/DCV)
<b>Overload protection</b>	600 V AC/DC (ACV/DCV/ $\Omega$ /continuity)
<b>Maximum rated voltage to earth</b>	<ul style="list-style-type: none"> <li>Jaw, CT6280: 600 V AC (Measurement category III), 300 V AC (Measurement category IV) (Anticipated transient overvoltage: 6000 V)</li> <li>Voltage measurement terminal: 600 V AC (Measurement category II), 300 V AC (Measurement category III) (Anticipated transient overvoltage: 4000 V)</li> </ul>
<b>AC measurement method</b>	3280-10F: Average value measurement RMS method 3280-20F: True RMS measurement method
<b>Display update rate</b>	400 ms $\pm$ 25 ms
<b>Noise rejection characteristics</b>	<ul style="list-style-type: none"> <li>NMRR DCV: <math>\sim</math>40 dB or more (50 Hz/60 Hz)</li> <li>CMRR DCV: <math>\sim</math>100 dB or more (<math>\sim</math>50 Hz/60 Hz, 1 k<math>\Omega</math> unbalance)</li> <li>ACV: <math>\sim</math>60 dB or more (50 Hz/60 Hz, 1 k<math>\Omega</math> unbalance) But, <math>\sim</math>45 dB or more for 600 V range.</li> </ul>
<b>Crest factor (3280-20F only)</b>	For 2500 counts or less, 2.5 Reduces linearly to 1.5 or less at 4200 counts
<b>Zero-display range</b>	5 counts (AC Current, jaw - flexible loop)
<b>Effects of conductor position</b>	<ul style="list-style-type: none"> <li>3280-10F, 3280-20F: within <math>\pm</math>5.0%</li> <li>CT6280: within <math>\pm</math>5.0% (At all positions around the sensor's centerpoint reference)</li> </ul>
<b>Maximum measurable conductor diameter</b>	<ul style="list-style-type: none"> <li>3280-10F, 3280-20F: <math>\phi</math>33 mm or less</li> <li>CT6280: <math>\phi</math>130 mm or less</li> </ul>

### General Specifications

<b>Operating environment</b>	Indoors, pollution degree 2, altitude up to 2000 m (6562 ft.)
<b>Operating temperature and humidity</b>	<ul style="list-style-type: none"> <li>Temperature: <math>-25^\circ\text{C}</math> to <math>65^\circ\text{C}</math> (<math>-13.0^\circ\text{F}</math> to <math>149.0^\circ\text{F}</math>) (40 M<math>\Omega</math> range: up to <math>40^\circ\text{C}</math>)</li> <li>Humidity (no condensation): Less than <math>40^\circ\text{C}</math> (<math>104.0^\circ\text{F}</math>): 80% RH or less</li> <li>At least <math>40^\circ\text{C}</math> (<math>104.0^\circ\text{F}</math>) but less than <math>45^\circ\text{C}</math> (<math>113.0^\circ\text{F}</math>): 60% RH or less</li> <li>At least <math>45^\circ\text{C}</math> (<math>113.0^\circ\text{F}</math>) but less than <math>50^\circ\text{C}</math> (<math>122.0^\circ\text{F}</math>): 50% RH or less</li> <li>At least <math>50^\circ\text{C}</math> (<math>122.0^\circ\text{F}</math>) but less than <math>55^\circ\text{C}</math> (<math>131.0^\circ\text{F}</math>): 40% RH or less</li> <li>At least <math>55^\circ\text{C}</math> (<math>131.0^\circ\text{F}</math>) but less than <math>60^\circ\text{C}</math> (<math>140.0^\circ\text{F}</math>): 30% RH or less</li> <li>At least <math>60^\circ\text{C}</math> (<math>140.0^\circ\text{F}</math>) but less than <math>65^\circ\text{C}</math> (<math>149.0^\circ\text{F}</math>): 25% RH or less</li> </ul>
<b>Storage temperature and humidity</b>	$-25^\circ\text{C}$ to $65^\circ\text{C}$ ( $-13^\circ\text{F}$ to $149^\circ\text{F}$ ), 80% RH or less (no condensation)
<b>Dustproof and waterproof</b>	IP40 (EN60529)
<b>Drop-proof distance</b>	1 m on concrete
<b>Standards</b>	Safety: EN61010 EMC: EN61326
<b>Power supply</b>	CR2032 Coin-shaped lithium battery $\times$ 1 (3 V DC) Maximum rated power: 15 mVA
<b>Continuous operating time</b>	<ul style="list-style-type: none"> <li>3280-10F: Approx. 120 hours</li> <li>3280-20F: Approx. 70 hours (AC current measurement mode, continuous, unloaded)</li> </ul>
<b>Dimensions</b>	<ul style="list-style-type: none"> <li>3280-10F, 3280-20F: Approx. 57W<math>\times</math>175H<math>\times</math>16D mm (2.24"W <math>\times</math> 6.89"H <math>\times</math> 0.63"D)</li> <li>CT6280: Approx. 42W<math>\times</math>65H<math>\times</math>18D mm (1.65"W <math>\times</math> 2.56"H <math>\times</math> 0.71"D) (excluding the flexible loop and output cable)</li> </ul>
<b>Mass</b>	<ul style="list-style-type: none"> <li>3280-10F, 3280-20F: Approx. 100 g (3.5 oz.) (including battery)</li> <li>CT6280: Approx. 71 g (2.5 oz.)</li> </ul>
<b>Product warranty period</b>	3280-10F, 3280-20F, CT6280: 3 years
<b>Accessories</b>	<ul style="list-style-type: none"> <li>9398 Carrying Case (C0205 Carrying Case when CT6280 is attached)</li> <li>L9208 Test lead</li> <li>CR2032 Coin-shaped lithium battery</li> <li>Instruction Manual</li> </ul>
<b>Options</b>	<ul style="list-style-type: none"> <li>CT6280 AC Flexible Current Sensor (Attachment is included)</li> <li>9209 Test Leads Holder</li> <li>L4933 Contact Pin Set (Can be connected to the tip of the L9208, which comes with the instrument.)</li> <li>L4934 Small Alligator Clip Set (Can be connected to the tip of the L9208, which comes with the instrument.)</li> </ul>



### Function Specifications

<b>Display</b>	Maximum count: 4199 counts
<b>Battery indicator warning voltage</b>	mark lights up at 2.3 V $\pm$ 0.15 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  $23^\circ\text{C} \pm 5^\circ\text{C}$ )

AC Current - Jaw (3280-10F)		
Range	Accuracy range	Accuracy
		50 Hz $\leq$ f $\leq$ 60 Hz
42.00 A	4.00 A to 41.99 A	$\pm$ 2.0% rdg.
420.0 A	40.0 A to 419.9 A	$\pm$ 1.5% rdg.
1000 A	100 A to 1000 A	$\pm$ 5 dgt.

AC Current - Flexible loop (3280-10F)		
Range	Accuracy range	Accuracy
		45 Hz $\leq$ f $\leq$ 66 Hz
42.00 A	4.00 A to 41.99 A	$\pm$ 2.0% rdg.
420.0 A	40.0 A to 419.9 A	$\pm$ 1.5% rdg.
1000 A	100 A to 1000 A	$\pm$ 5 dgt.

AC Current - Flexible loop (3280-20F)		
Range	Accuracy range	Accuracy
		50 Hz $\leq$ f $\leq$ 60 Hz
42.00 A	4.00 A to 41.99 A	$\pm$ 2.0% rdg.
420.0 A	40.0 A to 419.9 A	$\pm$ 1.5% rdg.
1000 A	100 A to 1000 A	$\pm$ 5 dgt.

AC Current - Flexible loop (3280-20F)		
Range	Accuracy range	Accuracy
		45 Hz $\leq$ f $\leq$ 66 Hz
42.00 A	4.00 A to 41.99 A	$\pm$ 3.5% rdg.
420.0 A	40.0 A to 419.9 A	$\pm$ 3.0% rdg.
1000 A	100 A to 1000 A	$\pm$ 5 dgt.*1, *2

AC Voltage		
Range	Accuracy range	Accuracy
		45 Hz $\leq$ f $\leq$ 66 Hz
4.200 V	0.400 V to 4.199 V	$\pm$ 2.5% rdg.
42.00 V	4.00 V to 41.99 V	$\pm$ 1.8% rdg.
420.0 V	40.0 V to 419.9 V	$\pm$ 7 dgt.
600 V	400 V to 600 V	$\pm$ 8 dgt.

DC Voltage		
Range	Accuracy range	Accuracy
		100 M $\Omega$ or more
420.0 mV	40.0 mV to 419.9 mV	$\pm$ 2.5% rdg.
4.200 V	0.400 V to 4.199 V	$\pm$ 2.5% rdg.
42.00 V	4.00 V to 41.99 V	$\pm$ 1.0% rdg.
420.0 V	40.0 V to 419.9 V	$\pm$ 3 dgt.
600 V	400 V to 600 V	$\pm$ 3 dgt.

Resistance		
Range	Accuracy range	Accuracy
		Open circuit voltage
420.0 $\Omega$	40.0 $\Omega$ to 419.9 $\Omega$	$\pm$ 2.0% rdg. $\pm$ 4 dgt.
4.200 k $\Omega$	0.400 k $\Omega$ to 4.199 k $\Omega$	$\pm$ 2.0% rdg. $\pm$ 4 dgt.
42.00 k $\Omega$	4.00 k $\Omega$ to 41.99 k $\Omega$	$\pm$ 2.0% rdg. $\pm$ 4 dgt.
420.0 k $\Omega$	40.0 k $\Omega$ to 419.9 k $\Omega$	$\pm$ 2.0% rdg. $\pm$ 4 dgt.
4.200 M $\Omega$	0.400 M $\Omega$ to 4.199 M $\Omega$	$\pm$ 5.0% rdg. $\pm$ 4 dgt.
42.00 M $\Omega$	4.00 M $\Omega$ to 41.99 M $\Omega$	$\pm$ 10.0% rdg. $\pm$ 4 dgt.

Continuity Check		
Range	Accuracy	Threshold of buzzer sound
420.0 $\Omega$	$\pm$ 2.0% rdg. $\pm$ 4 dgt.	50 $\Omega$ $\pm$ 40 $\Omega$ or less
		Open circuit voltage
		3.4 V or less