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INSTRUMENTOS DE MEDICIÓN INDUSTRIAL

Amperímetro AC, Hioki HK-3280-10F

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INSTRUMENTOS DE MEDICIÓN INDUSTRIAL

Instruction Manual

3280-10F

3280-20F

AC CLAMP METER



EN/TH/ID/VI

May 2016 Edition 1

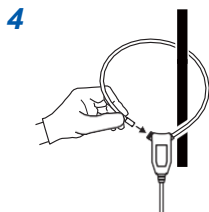
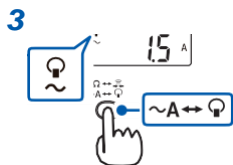
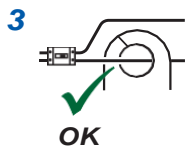
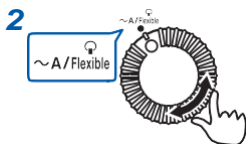
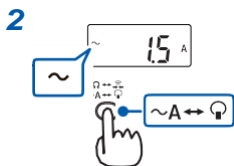
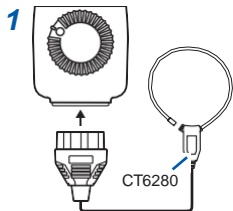
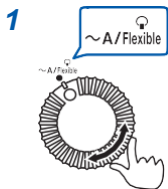
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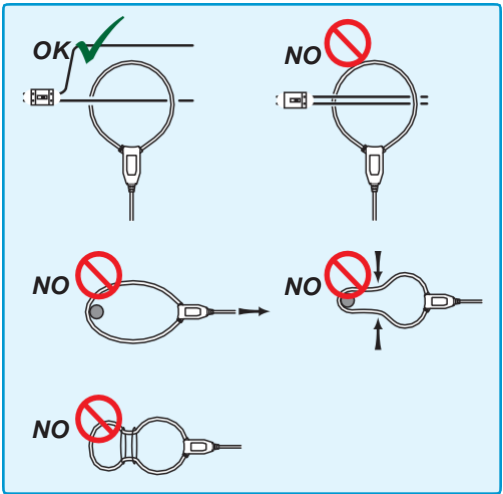


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~A

Flexible

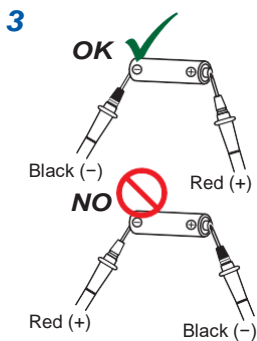
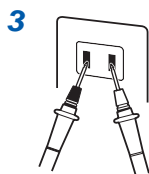
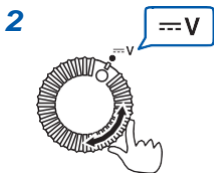
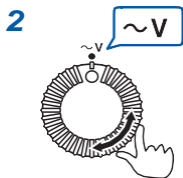
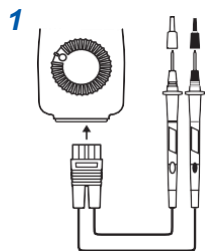
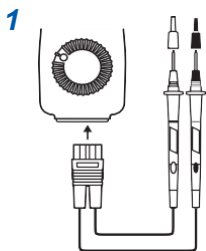




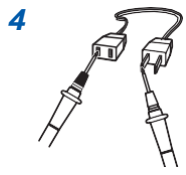
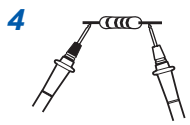
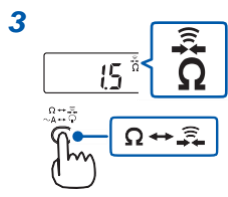
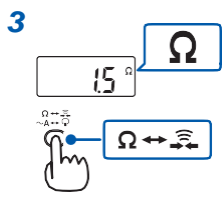
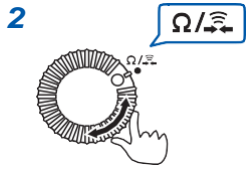
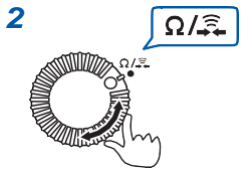
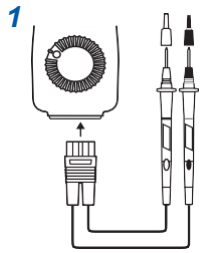
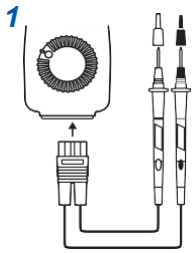
Measure-2

~V

==V



Measure-3



Measure-4

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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

Safety Notes

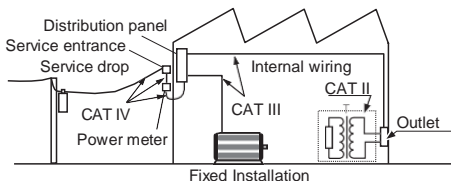
	Risk of electric shock
	Prohibited actions
	Actions that must be performed

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.
-



 **WARNING**

- 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



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 **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.
- 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. If you find any damage, contact your authorized Hioki distributor or reseller.
- If damage is suspected, check the section below before contacting your authorized Hioki distributor or reseller.

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 Hioki distributor or reseller. 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.

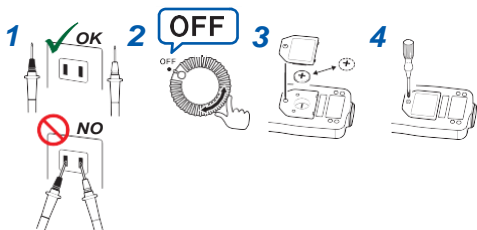
Maintenance/Inspection

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.

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

Functions

Auto power-saving function

Display will automatically turn off if the instrument is not used for 30 min.

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 **HOLD** 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.

Auto-range function

Automatically sets the measurement range to the most appropriate range.

Displays **[AUTO]**

Manual-range function

To set the measurement range arbitrarily.

1. Select the desired function with the rotary switch while holding down $\Omega \leftrightarrow \overline{\overline{\text{---}}}$ key.
2. Press $\sim A \leftrightarrow \overline{\overline{\text{---}}}$ key to switch the range.
(Can set the range as desired, except during continuity testing.)

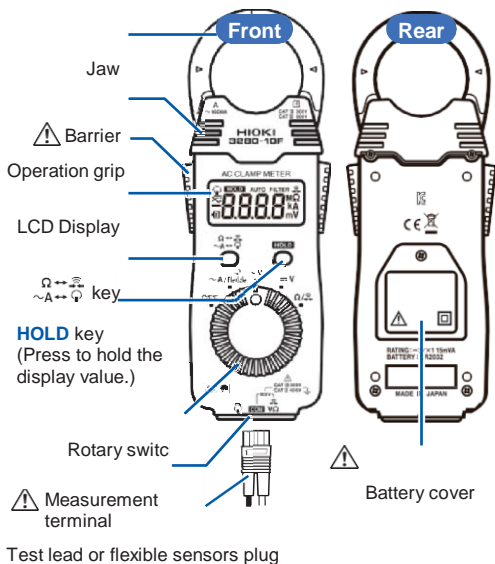
Overflow indication

Indication when input exceeds the measurement range.

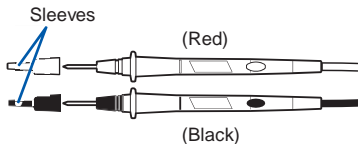
Displays **[OF]** or **[-OF]**

Parts Names

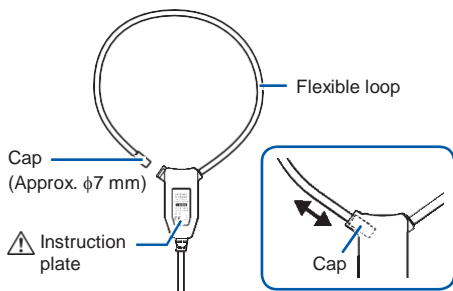
Example: 3280-10F



Test leads



AC Flexible Current Sensor (optional)



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.

General Specifications

Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562 ft.)
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Operating temperature and humidity

Temperature	-25°C to 65°C (-13.0°F to 149.0°F) (40 MΩ range: up to 40°C)
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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
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Specifications

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×1 (3 V DC) Maximum rated power: 15 mVA
Continuous operating time	<ul style="list-style-type: none">• 3280-10F: Approx. 120 hours• 3280-20F: Approx. 70 hours (AC current measurement mode, continuous, unloaded)
Dimensions	<ul style="list-style-type: none">• 3280-10F, 3280-20F: Approx. 57W×175H×16D mm (2.24"W × 6.89"H × 0.63"D)• CT6280: Approx. 42W×65H×18D mm (1.65"W × 2.56"H × 0.71"D) (excluding the flexible loop and output cable)
Mass	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 9398 Carrying Case (C0205 Carrying Case when CT6280 is attached)• L9208 Test lead• CR2032 Coin-shaped lithium battery• Instruction Manual

Options	<ul style="list-style-type: none"> • 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.)
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Basic Specifications

Maximum input current	<ul style="list-style-type: none"> • 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)
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Maximum input voltage	600 V AC/DC and 3×10^6 V·Hz or less (ACV/DCV)
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Overload protection	600 V AC/DC (ACV/DCV/ Ω /continuity)
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Maximum rated voltage to earth	<ul style="list-style-type: none"> • 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)
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Specifications

AC measurement method	<ul style="list-style-type: none"> • 3280-10F: Average value measurement RMS method • 3280-20F: True RMS measurement method 	
Display update rate	400 ms±25 ms	
Noise rejection characteristics	NMRR DCV	-40 dB or more (50 Hz/60 Hz)
	CMRR DCV	-100 dB or more (50 Hz/60 Hz, 1 kΩ unbalance)
	ACV	-60 dB or more (50 Hz/60 Hz, 1 kΩ unbalance) But, -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 ±5.0% CT6280: within ±5.0% (At all positions around the sensor's centerpoint reference)	
Maximum measurable conductor diameter	3280-10F, 3280-20F: φ33 mm or less CT6280: φ130 mm or less	

Function Specifications

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

Accuracy Specifications

Conditions of guaranteed accuracy	<ul style="list-style-type: none"> 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 $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$)
-----------------------------------	--

1 AC Current - Jaw (3280-10F)

Range	Accuracy range	Accuracy
		$50\text{ Hz} \leq f \leq 60\text{ Hz}$
42.00 A	4.00 A to 41.99 A	$\pm 1.5\% \text{ rdg. } \pm 5 \text{ dgt.}$
420.0 A	40.0 A to 419.9 A	
1000 A	100 A to 1000 A	

2 AC Current - Jaw (3280-20F)

Range	Accuracy range	Accuracy		
		$40 \text{ Hz} \leq f < 45 \text{ Hz}$	$45 \text{ Hz} \leq f \leq 66 \text{ Hz}$	$66 \text{ Hz} < f \leq 1 \text{ kHz}$
42.00 A	4.00 A to 41.99 A	$\pm 2.0\%$ rdg. ± 5 dgt.	$\pm 1.5\%$ rdg. ± 5 dgt.	$\pm 2.0\%$ rdg. ± 5 dgt.
420.0 A	40.0 A to 419.9 A			
1000 A	100 A to 1000 A			

Accuracy is not defined for currents of $5 \times 10^5 \text{ A} \cdot \text{Hz}$ or more.

3 AC Current - Flexible loop (3280-10F)

Range	Accuracy range	Accuracy
		$50 \text{ Hz} \leq f \leq 60 \text{ Hz}$
420.0 A	40.0 A to 419.9 A	$\pm 3.0\%$ rdg. ± 5 dgt. (includes accuracy of CT6280 AC Flexible Current Sensor: $\pm 1.0\%$ rdg.)
4200 A	400 A to 4199 A	

4 AC Current - Flexible loop (3280-20F)

Range	Accuracy range	Accuracy		
		40 Hz ≤ f < 50 Hz	50 Hz ≤ f ≤ 60 Hz	60 Hz < f ≤ 1 kHz
420.0 A	40.0 A to 419.9 A	±3.5% rdg. ±5 dgt.* ^{1,*2}	±3.0% rdg. ±5 dgt.* ¹	±3.5% rdg. ±5 dgt.* ^{1,*2}
4200 A	400 A to 4199 A			

*1: Includes accuracy of CT6280 AC Flexible Current Sensor: ±1.0% rdg.

*2: Accuracy is not defined for currents of 1000 A or more or currents of 5×10^5 A·Hz or more.

5 AC Voltage

Range	Accuracy range	Accuracy		Input impedance
		45 Hz ≤ f ≤ 66 Hz	66 Hz < f ≤ 500 Hz	
4.200 V	0.400 V to 4.199 V	±1.8% rdg. ±7 dgt.	±2.3% rdg. ±8 dgt.	11 MΩ±5%
42.00 V	4.00 V to 41.99 V			10 MΩ±5%
420.0 V	40.0 V to 419.9 V			10 MΩ±5%
600 V	400 V to 600 V			10 MΩ±5%

Specifications

6 DC Voltage

Range	Accuracy range	Accuracy	Input impedance
420.0 mV	40.0 mV to 419.9 mV	$\pm 2.5\%$ rdg. ± 5 dgt.	100 M Ω or more
4.200 V	0.400 V to 4.199 V	$\pm 1.0\%$ rdg. ± 3 dgt.	11 M Ω $\pm 5\%$
42.00 V	4.00 V to 41.99 V		10 M Ω $\pm 5\%$
420.0 V	40.0 V to 419.9 V		10 M Ω $\pm 5\%$
600 V	400 V to 600 V		10 M Ω $\pm 5\%$

7 Resistance

Range	Accuracy range	Accuracy	Open circuit voltage
420.0 Ω	40.0 Ω to 419.9 Ω	$\pm 2.0\%$ rdg. ± 4 dgt.	3.4 V or less
4.200 k Ω	0.400 k Ω to 4.199 k Ω		
42.00 k Ω	4.00 k Ω to 41.99 k Ω		
420.0 k Ω	40.0 k Ω to 419.9 k Ω		
4.200 M Ω	0.400 M Ω to 4.199 M Ω	$\pm 5.0\%$ rdg. ± 4 dgt.	
42.00 M Ω	4.00 M Ω to 41.99 M Ω	$\pm 10.0\%$ rdg. ± 4 dgt.	

8 Continuity Check

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

Warranty Certificate

Model	Serial No.	Warranty period Three (3) years from date of purchase (___ / ___)
--------------	-------------------	---

This product passed a rigorous inspection process at Hioki before being shipped.

In the unlikely event that you experience an issue during use, please contact the distributor from which you purchased the product, which will be repaired free of charge subject to the provisions of this Warranty Certificate. This warranty is valid for a period of three (3) years from the date of purchase. If the date of purchase is unknown, the warranty is considered valid for a period of three (3) years from the product's date of manufacture. Please present this Warranty Certificate when contacting the distributor. Accuracy is guaranteed for the duration of the separately indicated guaranteed accuracy period.

- Malfunctions occurring during the warranty period under conditions of normal use in conformity with the Instruction Manual, product labeling (including stamped markings), and other precautionary information will be repaired free of charge, up to the original purchase price. Hioki reserves the right to decline to offer repair, calibration, and other services for reasons that include, but are not limited to, passage of time since the product's manufacture, discontinuation of production of parts, or unforeseen circumstances.
- Malfunctions that are determined by Hioki to have occurred under one or more of the following conditions are considered to be outside the scope of warranty coverage, even if the event in question occurs during the warranty period:
 - Damage to objects under measurement or other secondary or tertiary damage caused by use of the product or its measurement results
 - Malfunctions caused by improper handling or use of the product in a manner that does not conform with the provisions of the Instruction Manual
 - Malfunctions or damage caused by repair, adjustment, or modification of the product by a company, organization, or individual not approved by Hioki
 - Consumption of product parts, including as described in the Instruction Manual
 - Malfunctions or damage caused by transport, dropping, or other handling of the product after purchase
 - Changes in the product's appearance (scratches on its enclosure, etc.)
 - Malfunctions or damage caused by fire, wind or flood damage, earthquakes, lightning, power supply anomalies (including voltage, frequency, etc.), war or civil disturbances, radioactive contamination, or other acts of God
 - Damage caused by connecting the product to a network
 - Failure to present this Warranty Certificate
 - Failure to notify Hioki in advance if used in special embedded applications (space equipment, aviation equipment, nuclear power equipment, life-critical medical equipment or vehicle control equipment, etc.)
 - Other malfunctions for which Hioki is not deemed to be responsible

***Requests**

- Hioki is not able to reissue this Warranty Certificate, so please store it carefully.
- Please fill in the model, serial number, and date of purchase on this form.

13-09

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