HIOKI

3293

CLAMP ON LEAK HiTESTER

INSTRUCTION MANUAL

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Introduction

Thank you for purchasing the HIOKI "Model 3293 CLAMP ON LEAK HiTESTER." To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

Overview

The 3293 CLAMP-ON LEAK HiTESTER is a small sized, thin type sensor that can measure current between a wide 30 mA to 1000 A range. It is constructed so that the position of the display panel can be adjusted to suit the measuring location, and the back light makes it easy to use even in dark places.

Inspection

Initial Inspection

When you receive the product, 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.

Maintenance and Service

- To clean the product, 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.
- If the protective functions of the product are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- If the product seems to be malfunctioning, contact your dealer or Hioki representative.

Safety

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

⚠DANGER

This product 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 product. 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 product defects.

Safety Symbol

⚠	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 AC (Alternating Current).
⚡	Indicates that the instrument may be connected to or disconnected from a live circuit.
⧈	Indicates a double-insulated device.

The following symbols in this manual indicate the relative importance of cautions and warnings.

⚠DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
⚠WARNING	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
⚠CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the device.
NOTE	Indicates advisory items related to performance or correct operation of the product.

Other Symbols

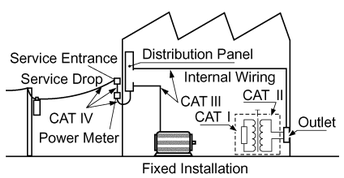
⃠	Indicates a prohibited action.

Measurement categories (Overvoltage categories)

This product complies with CAT III 300 V safety requirements. To ensure safe operation of measurement products, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called measurement categories. These are defined as follows.

CAT I: Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
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).

Higher-numbered categories correspond to electrical environments with greater momentary energy. So a measurement device designed for CAT III environments can endure greater momentary energy than a device designed for CAT II.
Using a measurement product in an environment designated with a higher-numbered category than that for which the product is rated could result in a severe accident, and must be carefully avoided. Never use a CAT I measuring product in CAT II, III, or IV environments. The measurement categories comply with the Overvoltage Categories of the IEC60664 Standards.



Usage Notes

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

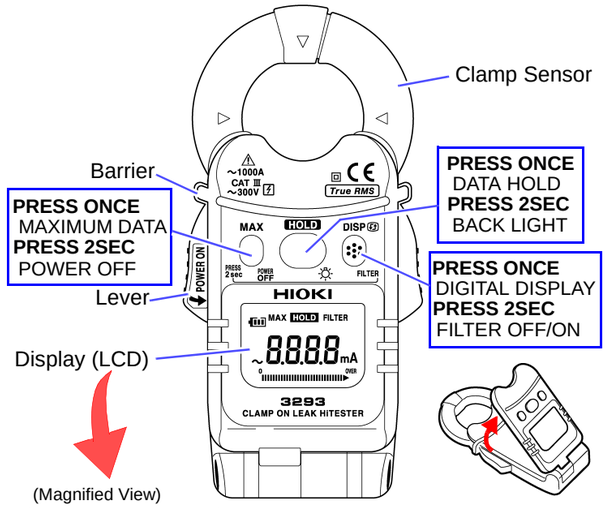
⚠WARNING

- Do not allow the product to get wet, and do not take measurements with wet hands. This may cause an electric shock.

⚠CAUTION

- Do not store or use the product where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This instrument contains a magnetic core. The device should not be used by anyone with a pacemaker or any other electronic medical devices installed in his body.

Names and Functions of Parts



(Magnified View)

* The device considers the maximum displayed value to be the MAX value.

~	Alternating current (AC)
MAX	MAX value
HOLD	Data hold function
FILTER	Filter ON
▮▮▮▮▶	Bar graph
OVER	Over range
▭	Battery low warning (4 levels)

Functions

Power ON/OFF	Grasping the lever and opening wide the CLAMP SENSOR causes the power to turn on automatically. Pressing the POWER OFF key for 2 seconds or longer turns the power off.
Measurement Value HOLD	Press the HOLD key once to hold the present measurement value for reading. Press it once again to release the hold. Release data hold using FILTER ON/OFF.
Maximum Measured Value Display	Press the MAX key once to turn on the MAX value display. The device returns to standard measurement display after approximately 15 seconds. Please refer to "Regarding the MAX value display".
Filter	When set to ON, the filter removes noise and other unwanted frequency components.
Backlight	The backlight can be turned ON/OFF by pressing the ☼ key for 2 seconds or longer.
Display Reversing	The display reverses automatically with the opening and closing of the main body. The display can also be reversed by pressing the DISP key once.
Remaining Battery Display	Displays 4 levels of remaining battery charge.
Auto Power Off	The power cuts off when "0" is displayed continuously for 1 minute with FILTER ON. The power cuts off when 2.00 mA or lower is displayed continuously for 1 minute with FILTER OFF. The power will turn off automatically after 5 minutes even if the data hold state continues. You can disable the auto-power off function by pressing the HOLD key while turning on the device.

Specifications

Measurement specification

- Temperature and humidity for guaranteed accuracy: 23±5°C (73±9°F), 80%RH or less.
- Guaranteed accuracy period: 1 year, or opening and closing of the Clamp Sensor 10,000times, whichever comes first.)
- Guaranteed accuracy range: With Filter ON: 1mA or above
  With Filter OFF: 2.70mA or above
  With Filter ON or OFF: Add ±3.5% rdg. from 1.0 mA to 2.69 mA ; add ±1%rdg. from 0.270 A to 0.539 A; add ±1%rdg. when measuring at the 60 A range

AC current A rms (true rms indication, Auto range)

Range	Guaranteed accuracy	Display range	Resolution	Accuracy	
				FILTER ON	FILTER OFF
30 mA	2.70 mA to 30.00 mA	0.06 mA to 30.00 mA	0.01 mA	±1.5%rdg. ±5dgt. (50 Hz to 60 Hz)	±2.0%rdg. ±5dgt (45 Hz to 66 Hz) ±3.0%rdg. ±5dgt (66 Hz to 400 Hz)
300 mA	27.00 mA to 300.0 mA	27.00 mA to 300.0 mA	0.1 mA		
6 A	0.540 A to 6.000 A	0.270 A to 6.000 A	0.001 A		
60 A	5.40 A to 60.00 A	5.40 A to 60.00 A	0.01 A		
600 A	54.0 A to 600.0 A	54.0 A to 600.0 A	0.1 A		
1000 A	540 A to 1000 A	540 A to 1000 A	1 A		

Effect of conductor position	:Within±0.1% (up to 6 A range), Within±5.0% (greater than 60 A range) (in any position based on the center of the clamp sensor)
Maximum rated voltage to earth	: 300 Vrms
Crest factor	: 2.8 (up to 600 A), 1.6 (greater than 600 A)
Diameter of measurable conductor	: 24 mm dia. max.
Temperature coefficient	: 0.05 × precision specification / °C 0 to 40°C (32 to 104°F)
Magnetic field interference	: Maximum 7.5 mA in an external magnetic field of AC 60 Hz 400 A/m (6 A range max.)
Response time	: 1.5sec. max.
Maximum input current	: 1000 A

* rdg. (reading or displayed value), dgt. (resolution)

General Specifications

Filter	Details of operation: Cutoff frequency :180 Hz±30 Hz (-3dB) Initial setting: ON (Always ON when the power supply is turned on; non-filtered data is not saved) Activate/De-activate: Press FILTER key for 2 seconds or longer.
Data hold function	Details of operation: Holds displayed values (data update is halted) Hold method/ Canceling a Hold: Pressing the HOLD key once
MAX value display	Details of operation: Displays the maximum value reached since the power has been turned on. Displays the maximum bits as a bar graph. Activate: Pressing the MAX key once. De-activate: Function will automatically de-activate after maximum value is displayed for 15 seconds. Manually de-activate the MAX function by pressing the MAX key once after the MAX value display has been cleared. Clear displayed maximum value: Power OFF, or press the MAX key once while the maximum value is being displayed.
Power supply control	ON: Open the CLAMP SENSOR wide (sideways). OFF: Press POWER OFF key for 2 seconds or longer.
Auto Power Off	Details of operation: Filter ON: the power cuts off when "0" is displayed continuously for 1 minute. Filter OFF: the power cuts off when "200" or lower is displayed continuously for 1 minute. Power also cuts off when the device is in Data Hold mode continuously for 5 minutes. To de-activate: Power ON while pressing the HOLD key. (non-filtered data is not saved)
Battery Level Indicator	Details of operation: Remaining battery power shown as zero ▭ at 2.0 V (±0.1 V) Power automatically turns off at 1.8 V (±0.1 V)
Back light	Setting method: Press ☼ key for 2 seconds or longer.
Display update rate	Digital display: 500 ms±25 ms (approx. 2 times / second) Bar graph display: 250 ms±12.5 ms (approx. 4 times / second)
Liquid crystal display (LCD) reversal	Details of operation: Automatically reverses when the display panel is opened and closed. Manual reversal: Pressing the DISP key once
Display	LCD: monochrome, 91 segments
Operating temperature and humidity	0 to 40°C (32°F to 104°F), 80%rh max (no condensation)
Storage temperature and humidity	-10 to 50°C (14°F to 122°F), 80%rh max (no condensation)

Location for use	Altitude up to 2000 m (6562 feet), indoors
Rated supply voltage	3 VDC × 1
Maximum rated power	25 mVA
Power supply	CR2032 × 1 Lithium battery
Battery lifetime	Approx 15 hours (continuous, no load)
Dimensions and mass	Approx. 50W × 130H × 26D mm (1.97"W × 5.12"H × 1.02"D) Approx. 120 g (4.2 oz.)
Dielectric strength	3536 Vrms /15sec., 5 mA sensitivity current between the chassis and clamp core
Applicable standards	Safety EN61010 Measurement Category III 300 V (anticipated transient over voltage 4000 V) Pollution Degree2 EMC EN61326
Accessories	9757 CARRYING CASE, Strap*, CR2032 Lithium battery, Instruction manual, Basic operation instructions sticker (in Japanese, Chinese, Korean and Italian) *Attach as required.

Measurement Procedure

Pre-Operation Inspection (Check the following before using the product.)

- Before using the product the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.
- The clamp sensor or the case shall be free of damage. (If damage has occurred, avoid using the product. Use of the product under these conditions may result in electric shock.)
- The mating portions of the clamp sensor shall mate properly. The mating portions of the clamp sensor should also be free of any scratches or cracks.
- Battery power should be near full capacity when power is turned on. (The mark will appear when the batteries are low. Accurate measurement is not possible when the batteries are low.)
- The reading should be around 0 A using the current function when no measurements are being made.

⚠DANGER

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

⚠CAUTION

- Be careful to avoid dropping the clamps or otherwise subjecting them to mechanical shock, the CLAMP SENSOR tip will be damaged, negatively influencing measurement.
- Do not input current greater than 1000 A. It will damage the device.

NOTE

- Please note that waveforms that include elements outside the frequency characteristic range may not be measured correctly.
- Accurate 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.

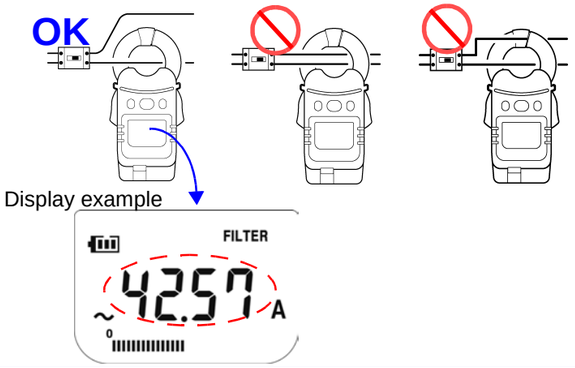
AC Current Measurement ⚠

⚠DANGER

To avoid short circuits and potentially life-threatening hazards, never attach the product in current measurement mode to a circuit that operates at more than the maximum rated voltage CATIII 300 V, or over bare conductors.

Open Jaws to Power On.

1. Clamp the tester on the conductor so that the conductor passes through the center of the clamp core. Clamp the tester on one wire only.
2. The effective value is shown on the digital display.



NOTE

- Press the HOLD key once when you want to freeze the displayed value for reading. (Data Hold function).

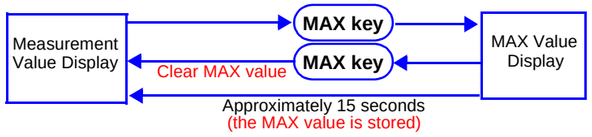
Leak Current Measurement ⚠

NOTE

- For measurement of single-phase 2-wire circuits, clamp both wires of the circuit.
- For measurement of three-phase 4-wire circuits, clamp all four wires of the circuit. If this is not possible, the measurement can also be carried out on the ground wire of the equipment.
- Do not input current that exceeds the maximum continuous input of the electric current range.
- Measurement may not be accurate in the cases below.
  (1) When there is large current (of about 100 A) flowing through a nearby electric line.
  (2) When using the 3293 to measure special waveforms, such as those on the secondary side of an inverter
- Note that a value of several tens of amperes may be displayed when opening or closing the clamp sensor, or when changing the electric current range. This is not an error. It may take some time for the display to return to zero. However, starting measurement before the display returns to zero will not affect measurement.

Regarding the MAX value display

(1) Press the MAX key once to confirm the MAX value. If the MAX value is renewed, the new value will be displayed as the MAX value. After approximately 15 seconds the device will return will return to normal measurement display and the MAX value will be saved.
(2) You can clear the MAX value by pressing the MAX key while the MAX value is being displayed.
(3) Frequent opening and closing of the clamp sensor may wire the device to store data in several 10's of counts. When measuring for the maximum value of very low current, clamp onto the conductor and clear any residual maximum values before conducting your test.



NOTE

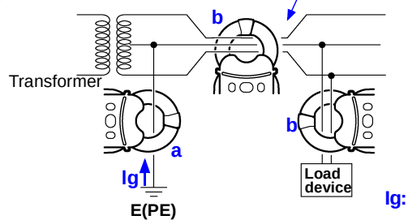
The MAX value is cleared with FILTER ON/OFF.

Regarding the Auto Power Off Function

The device will automatically turn off if the measured current remains 0 for 1 minute. When measuring leakage current, if you wish to disable the Auto Power Off function, turn the device's power on while pressing the HOLD key. Press the POWER OFF key for 2 seconds or longer to turn the device off.

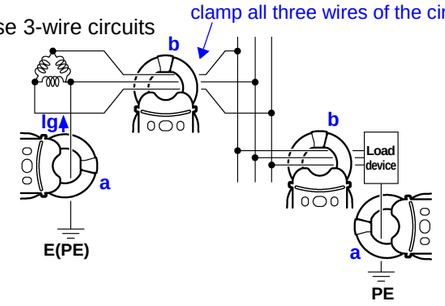
1. Clamp the tester on the conductor, so that the conductor passes through the center of the clamp sensor. For measurement of grounded wires, clamp the tester on one wire only (see **a**). For overall measurements, clamp the tester on the entire circuit path (see **b**).
2. The effective value (RMS) of the leak current is shown on the digital display. The selected current range is shown at the bottom of the display.

single-phase 3-wire circuits — clamp all three wires of the circuit



Ig: leak Current

three-phase 3-wire circuits — clamp all three wires of the circuit



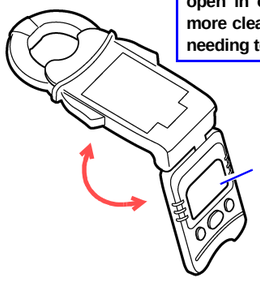
NOTE

The MAX value is cleared with FILTER ON/OFF.

Opening and Closing the Display Panel

Adjust the angle of the display panel for better viewing.

Take measurements with the display panel flipped open in order to view the measurement results more clearly, especially in tight locations, without needing to twist the jaw at an awkward angle.



The display can also be reversed by pressing the DISP key.

Replacing Battery

⚠WARNING

- To avoid electric shock when replacing the battery first disconnect the clamp from the object to be measured. After replacing the batteries, replace the cover and screws before using the product.
- Use only CR2032 lithium battery. Use of any other battery may result in explosion.
- Be sure to insert them with the correct polarity. Otherwise, poor performance or damage from battery leakage could result.

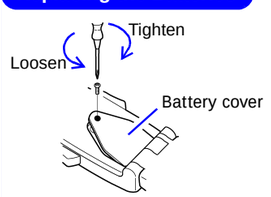
⚠WARNING

- 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.
- To avoid corrosion from battery leakage, remove the batteries from the product if it is to be stored for a long time

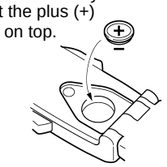
NOTE

- The current battery condition is shown by the mark in the upper left of the display. The mark will appear when the batteries are low. Accurate measurement is not possible when the batteries are low. Replace the new batteries soon.
- The batteries included with the device were installed for factory testing purposes. CR2032 lithium batteries can be purchased at electronics and appliance stores where specialized batteries are sold.

Replacing the Batteries



Position the battery so that the plus (+) side is on top.



1. Press and hold the POWER OFF key for 2 seconds or longer to turn off the device's power.
2. Remove the battery cover screws on the back of the device with a Phillips screwdriver, then remove the battery cover.
3. Replace with a new battery. When inserting a new battery (CR2032 lithium battery), be sure to position the polarities in their proper orientations.
4. 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

Regarding the Basic Operation Instructions sticker

Afix the included Basic Operation Instructions sticker (in Japanese, Chinese, Korean and Italian) to the device as necessary.

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION
Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan
Product Name: CLAMP ON LEAK HiTESTER
Model Number: 3293

The above mentioned product comforms to the following product specifications:

Safety: EN61010-2-032:2002
EMC: EN 61326-2-2:2006
ClassB equipment
Portable test, measuring and monitoring equipment used in low-voltage distribution systems

Supplementary Information:
The product herewith complies with the requirements of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC.

25 January 2008

HIOKI E.E. CORPORATION
Mitsuyoshi Tanaka
Director of Quality Assurance
3293A999-02