HIOKI

CT9667

FLEXIBLE CLAMP ON SENSOR

Instruction Manual

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HIOKI
HIOKI E.E. CORPORATION
Headquarters
81 Koizumi, Ueda, Nagano 386-1192, Japan
TEL +81-268-28-0562 FAX +81-268-28-0568
E-mail: os-com@hioki.co.jp URL http://www.hioki.com/
(International Sales and Marketing Department)
1307

For regional contact information, please go to our website at http://www.hioki.com.

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 one (1) year 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 CT9667 Flexible Clamp on Sensor. To obtain maximum performance from the device, please read this manual first, and keep it handy for future reference.

Initial Inspection

When you receive the device, 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 authorized Hioki distributor or reseller.

Overview

The CT9667 measures large currents of up to 5000 A AC.
The hollow core coil makes the sensor unit highly flexible, allowing it to be used for clamping in narrow spaces with crowded wiring.

Safety Information

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

⚠DANGER

This device 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 device. Using the device 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 device defects.

Safety Symbols

⚠	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the device. The ⚠ symbol printed on the device indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
⧈	Indicates a double-insulated device.
⎓	Indicates DC (Direct Current).
~	Indicates AC (Alternating Current).
	Wear appropriate protective insulation (insulating rubber gloves and boots, helmet and etc.) when connecting and disconnecting from live electric circuits.

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 device.

Symbols for Various Standards

	WEEE marking: This symbol indicates that the electrical and electronic appliance is put on the EU market after August 13, 2005, and producers of the Member States are required to display it on the appliance under Article 11.2 of Directive 2002/96/EC (WEEE).
CE	This symbol indicates that the product conforms to safety regulations set out by the EC Directive.

Other Symbols

⃠	Indicates a prohibited action.

Accuracy

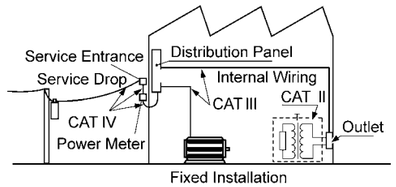
rdg. (reading or displayed value)	The value currently being measured and indicated on the measuring instrument.
f.s. (maximum display value or scale length)	The maximum displayable value or scale length. This is usually the name of the currently selected range.

Measurement categories

This device complies with CAT III (1000 V), CAT IV (600 V) safety requirements. To ensure safe operation of measurement devices, 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 device in an environment designated with a higher-numbered category than that for which the device 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.

Instrument Installation

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

- Exposed to direct sunlight
- Exposed to high temperature
- In the presence of corrosive or explosive gases
- Exposed to water, oil, other chemicals, or solvents
- Exposed to high humidity or condensation
- Exposed to strong electromagnetic fields
- Near electromagnetic radiators
- Exposed to high levels of particulate dust
- Near induction heating systems (e.g., high-frequency induction heating systems and IH cooking utensils)

Storage temperature and humidity (no condensation)
: -10 to 60°C (14 to 140°F), 80%RH or less
Operating temperature and humidity (no condensation)
: 0 to 40°C (32 to 104°F), 80%RH or less
: 40 to 45°C (104 to 113°F), 60%RH or less
: 45 to 50°C (113 to 122°F), 50%RH or less

Preliminary Checks

Before using the device for 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 authorized Hioki distributor or reseller.

⚠DANGER

- **Before using the device, make sure that the insulation on the cables is undamaged and that no bare conductors are improperly exposed. Using the device in such conditions could cause an electric shock, so contact your authorized Hioki distributor or reseller for repair.**
- **To avoid short circuits and potentially life-threatening hazards, never attach the device to a circuit that operates at more than 1000 V AC.**
- **This device 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.**
- **The maximum input current is 10,000 A. Attempting to measure current in excess of the maximum input could destroy the device and result in personal injury or death.**
- **The maximum rated voltage between input terminals and the ground is as follows;**
  (CAT III) 1000 Vrms AC
  (CAT IV) 600 Vrms AC
  Attempting to measure voltages exceeding this level with respect to ground could damage the device and result in personal injury.

⚠WARNING

- **Do not allow the device to get wet, and do not take measurements with wet hands. This may cause an electric shock.**
- **To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.**
- **To avoid electric shock, stop using this device if it shows either of the following signs of damage, and do not use the device again until it has been repaired.**
  1.The yellow sensor cover is damaged, and any red part is visible beneath the cover.
  2.The yellow connector cover is damaged, and any black part is visible beneath the cover.
- **Before turning the device on, make sure the supply voltage matches that indicated on the AC adapter. Connection to an improper supply voltage may damage the device or AC adapter and present an electrical hazard.**

⚠CAUTION

- Be careful to avoid dropping the device or otherwise subjecting them to mechanical shock, which could damage the mating surfaces and adversely affect measurement.
- Do not slant the device or place it on top of an uneven surface. Dropping or knocking down the device can cause injury or damage to the device.
- Keep the clamp sensor connector free from foreign objects, which could interfere with clamping action.
- Avoid stepping on or pinching cables, which could damage the cable insulation.
- To avoid damaging the cables, do not bend or pull them.
- Note that the device may be damaged if current exceeding the selected measurement range is applied for a long time.

NOTE

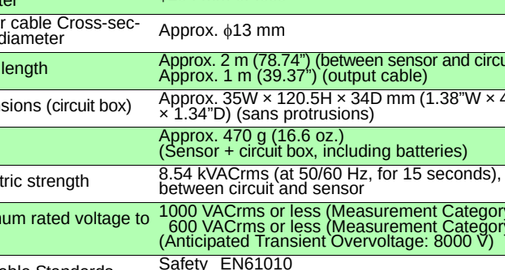
Accurate measurement may be impossible in the presence of strong magnetic fields, such as near transformers and high-current conductors, or in the presence of strong electromagnetic fields such as near radio transmitters.

Specifications

(Accuracy guaranteed for one year at 23±5°C (73±9°F), 80%RH or less)

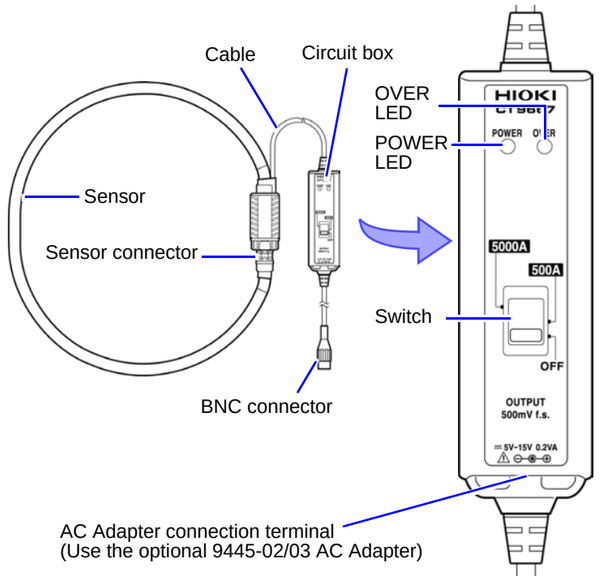
Operating environment	Indoors, Pollution Degree 2, altitude up to 2000 m (6562-ft.)
Operating temperature and humidity	Temperature: 0 to 50°C (32 to 122°F) Humidity (non-condensating) : 0 to 40°C (32 to 104°F), 80%RH or less : 40 to 45°C (104 to 113°F), 60%RH or less : 45 to 50°C (113 to 122°F), 50%RH or less (When using batteries, depends on battery specifications.)
Storage temperature and humidity	-10 to 60°C (14 to 140°F), 80%RH or less (non-condensating), excluding batteries
Power supply	LR6 alkaline battery x 2 or AC Adapter (option) or external 5 to 15 V DC power supply
Rated supply voltage	When using batteries: 1.5 VDC × 2 When using AC adapter or external DC power supply: 5 to 15 VDC (Voltage fluctuations of ±10% from the rated supply voltage are taken into account.)
Maximum rated power	When using batteries: 35 mVA When using AC adapter or external DC power supply: 0.2 VA
Continuous operating time (using batteries)	Approx. 7 days (at 23°C, continuous)
Measurable conductor diameter	ϕ254 mm or less
Sensor cable Cross-sectional diameter	Approx. ϕ13 mm
Cable length	Approx. 2 m (78.74") (between sensor and circuit box) Approx. 1 m (39.37") (output cable)
Dimensions (circuit box)	Approx. 35W × 120.5H × 34D mm (1.38"W × 4.74"H × 1.34"D) (sans protrusions)
Mass	Approx. 470 g (16.6 oz.) (Sensor + circuit box, including batteries)
Dielectric strength	8.54 kVACrms (at 50/60 Hz, for 15 seconds), between circuit and sensor
Maximum rated voltage to earth	1000 VACrms or less (Measurement Category III) 600 VACrms or less (Measurement Category IV) (Anticipated Transient Overvoltage: 8000 V)
Applicable Standards	Safety EN61010 EMC EN61326, EN61000-3-2, EN61000-3-3
Accessories	LR6 alkaline battery ..... 2 Instruction Manual (Japanese/ English/ Chinese) .....each 1
Options	9445-02 AC Adapter 9445-03 AC Adapter (for EU)
Conditions of guaranteed accuracy	23±5°C (73±9°F), 80%RH or less, No deformation of winding cross-section
Period of guaranteed accuracy	1 year
Rated primary current	5000 A AC/ 500 A AC
Measurement ranges	5000 A AC/ 500 A AC
Crest factor	3 or less
Maximum input current	10,000 A continuous (at 45 to 66 Hz)
Output voltage	500 mVAC f.s.
Amplitude accuracy	±2% rdg.±0.3% f.s. (at 45 to 66 Hz, at sensor center)
Offset voltage	±1 mV or less
Phase accuracy	Within ±1° (at 45 to 66 Hz)
Frequency band	10 Hz to 20 kHz (within ±3dB)
Temperature characteristic	0 to 50°C range: 0.05 × accuracy specifications/°C 32 to 122°F range: 0.09 × accuracy specifications/°F
Effect of conductor position	Within ±3% (deviation from center)
Effect of external magnetic field	1.5%/f.s. or less. (in a magnetic field of 400 A/m, 50/60 Hz)
Output impedance	50 Ω (±5%)

Frequency derating characteristics (continuous, design values)



POWER LED indicator	Green: Power supply is on. Red: Battery life is low (when using battery power). Off: Power supply is off.
OVER LED indicator	Red: Range exceeded (peak value of at least 3× range).

Names of Parts



Pre-Operation Inspection

Check the following before using the device.

Check Items	Diagnose and Solution
Is there a broken connection involving the connector or sensor base?	If you are unable to make measurements properly, discontinue use and contact your authorized Hioki distributor or reseller.
Is the cable insulation torn?	If there is any damage, electric shock may result. Discontinue use and have the sensor repaired.
When the switch is placed in any position other than "OFF," does the POWER LED turn green?	If the LED turns red, the remaining battery life is low. Replace the batteries soon. If the LED does not turn on, there is no battery life remaining. Replace the batteries.

Measurement Procedures

1 Insert the batteries.

⚠WARNING

- **To avoid electric shock when replacing the batteries, first disconnect the clamp from the object to be measured, and then remove the battery cover.**
- **After replacing the batteries, replace the battery cover and screws before using the device.**
- **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.**

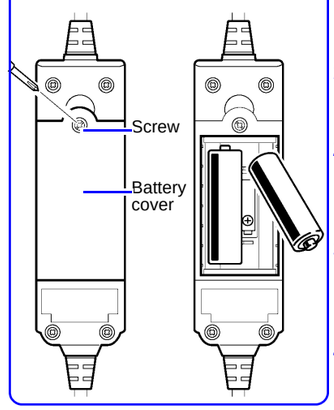
⚠CAUTION

Do not mix old and new batteries, or different types of batteries. Also, be careful to observe battery polarity during installation. Otherwise, poor performance or damage from battery leakage could result.

NOTE

- After use, always turn OFF the power.
- The [POWER] LED will turn red when battery voltage becomes low. Replace the batteries as soon as possible.
- When using an AC adapter, always use the optional AC adapter.
- When using the AC adapter and batteries at the same time, the AC adapter takes precedence. Switching between the AC adapter and battery power during measurement may cause interference in the output.

Rear of Circuit box



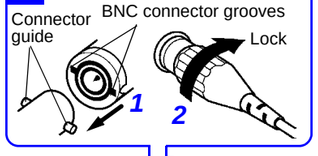
Necessary tool:
Two LR6 alkaline batteries
Phillips screwdriver

1. Turn OFF the power to the circuit box. If the AC adapter is connected, disconnect it.
2. Turn the circuit box over and use a Phillips screwdriver to remove the retaining screw from the battery cover.
3. Remove the battery cover and mount two new LR6 alkaline batteries. Make sure the polarity is correct.
4. Mount the battery cover and tighten the retaining screw.

⚠CAUTION

When disconnecting the BNC connector or sensor connector, be sure to release the lock before pulling off the connector. Forcibly pulling the connector without releasing the lock, or pulling on the cable, can damage the BNC connector or sensor connector.

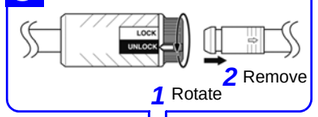
2 Connect the BNC connector.



Engage the BNC connector grooves with the connector-guide projections, and turn the connector clockwise to lock the components.

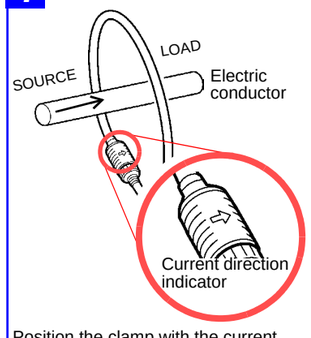
To remove the BNC connector: Turn the connector counterclockwise and pull it out.

3 Open the sensor connector.



Rotate the dial on the connector and remove the sensor after aligning the ⏷ mark in the "UNLOCK" position.

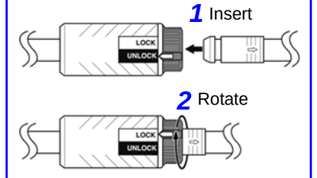
4 Clamp the conductor.



Position the clamp with the current direction indicator pointing toward the load side. (If installed in the opposite direction, the phase deviates 180 degrees.)

Hold only one conductor at the clamp center with the current direction indicator pointing toward the load side.

5 Connect the connector.

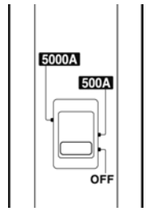


Insert the sensor into the connector and rotate the dial until the ⏷ mark is in the "LOCK" position.

NOTE

The clamp sensor connection may come loose if it is pulled with excessive force.

6 Select the range.



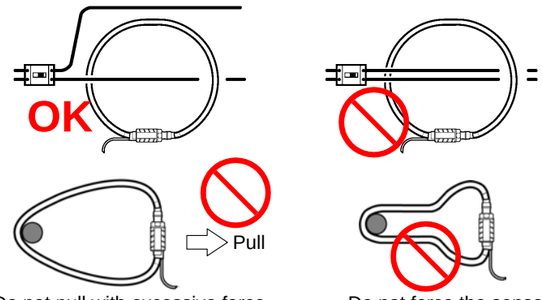
Select the desired current range with the switch.

NOTE

When using the AC adapter for continuous monitoring, we recommend that you also use batteries to prevent interruptions due to instantaneous power outages.

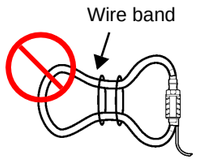
NOTE

Attach the clamp around only one conductor. Single-phase (2-wire) or three-phase (3-wire) cables clamped together will not produce any reading.



Do not pull with excessive force while clamped around a conductor.

Do not force the sensor into a bent position.



Do not store unused in a bent position.

Maintenance and Service

⚠WARNING

Do not attempt to modify, disassemble or repair the device; as fire, electric shock and injury could result.

⚠CAUTION

To avoid corrosion and damage to this device from battery leakage, remove the batteries from the device if it is to be stored for a long time.

- To clean the device, 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 device seems to be malfunctioning, contact your authorized Hioki distributor or reseller. Pack the device so that it will not sustain damage during shipping, and include a description of existing damage. We do not take any responsibility for damage incurred during shipping.