

# 9657-10

## CLAMP ON LEAK SENSOR

### Instruction Manual

September 2015 Revised edition 8  
Printed in Japan  
9657B981-08 15-09H



HIOKI

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Edited and published by HIOKI E.E. CORPORATION

2402 EN  
Printed in Japan

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#### 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 9657-10 CLAMP ON LEAK SENSOR. To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

#### 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.

#### Preliminary Check

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.

- Before using the product, make sure that the insulation on the cables is undamaged and that no bare conductors are improperly exposed. Using the product in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.

#### 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 product seems to be malfunctioning, confirm that the cables are not open circuited before contacting your dealer or Hioki representative. When sending the product for repair, pack the product carefully so that it will not be damaged during shipment, and include a detailed written description of the problem. Hioki cannot be responsible for damage that occurs during shipment.

## Overview

The 9657-10 is a voltage output type clamp on sensor compatible to 10A AC measurements. The instrument can be relied upon to measure subtle current with great accuracy due to the high magnetic permeability material used for the core and magnetic shield.

## Specifications

Accuracy is guaranteed for one year at 23±5°C (73±9°F) and Max. 80% RH. (Opening and Closing of the Sensor: Maximum 10000 times)  
Guaranteed accuracy period after adjustment made by Hioki: 1 year

Rated current	10 A AC
Output voltage	100 mV AC/A
Amplitude accuracy	±1.0% rdg.±0.05% f.s. (f.s.: 10 A) (at the Jaw center, 45 to 66 Hz)
Phase accuracy	within ±3°(at 50 Hz, 60 Hz, Measurement current: Min. 1 A)
Maximum input current	30 A continuous at 45 to 66 Hz (Ambient temperature: 50°C)
Measurable conductor	Insulated conductor
Effect of conductor position	within ±0.1% (in any direction from sensor center)
Effect of external magnetic fields	400 A AC/m corresponds to 5 mA, Max. 7.5 mA
Remaining electric current character	Max. 5 mA (in 100 A go and return electric wire)
Operating temperature and humidity range	0 to 50°C (32 to 122°F) Max. 80%RH (no condensation)
Storage temperature and humidity range	-10 to 60°C (14 to 140°F) Max. 80%RH (no condensation)
Location for use	Altitude up to 2000 m (6562 feet), Indoors

Standards applying	<b>EMC</b> EN 61326 <b>Safety</b> EN 61010 Pollution Degree 2
Diameter of measurable conductor	Within φ 40 mm (1.57")
Cable length	Approx. 3 m (118.11")
External dimensions	Approx. 74W x 145H x 42D mm 2.91"W x 5.71"H x 1.65"D (excluding protrusions)
Mass	Approx. 380 g (12.2 oz.)
Accessories	Instruction manual

We define measurement tolerances in terms of f.s. (full scale) and rdg.(reading) values, with the following meanings:

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

## Safety

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

### **⚠DANGER**

This product is designed to conform to 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.

#### Symbols affixed to device

	Indicates cautions and hazards. When the symbol is printed on the device, refer to a corresponding topic in the Instruction Manual.
	Indicates AC (Alternating Current).
	Indicates that only insulated conductors suited to the voltage of the circuit under test can be measured.

#### Symbols for various standards

	IThis symbol indicates that the product conforms to regulations set out by the EC Directive.
	Indicates the Waste Electrical and Electronic Equipment Directive (WEEE Directive) in EU member states

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 product.

### **NOTE**

Advisory items related to performance or correct operation of the product.

## Usage Notes

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

### **⚠DANGER**

Do not measure around a bare conductor. Doing so may result in short-circuit or electric shock. Take measurements at a location on an insulated wire where there is sufficient insulation for the circuit voltage.

### **⚠WARNING**

- To avoid electric shock, do not allow the product to get wet, and do not use it when your hands are wet.
- 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 when measuring the ground conductor on a transformer Class 2 connection site, be careful not to approach high voltage devices or conductors. Also, if close to high voltage charging devices or if measurement is otherwise difficult, first change the route of the grounding wire.

### ⚠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.
- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.
- Be careful to avoid dropping the product or otherwise subjecting them to mechanical shock, which could damage the mating surfaces of the jaw and adversely affect measurement.
- Keep the clamp jaws and jaws slits free from foreign objects, which could interfere with clamping action.
- Keep the jaws closed when not in use, to avoid accumulating dust or dirt on the mating core surfaces, which could interfere with clamp performance.
- Measurements are degraded by dirt on the mating surfaces of the clamp-on sensor, so keep the surfaces clean by gently wiping with a soft cloth.
- This product is not designed to be entirely water- or dust-proof. To avoid damage, do not use it in a wet or dusty environment.
- This product is designed for indoor use, and operates reliably from 0°C to 50°C.
- This product should be installed and operated indoors only, between 0 and 50°C and 80% RH or less
- Avoid stepping on or pinching the cable, which could damage the cable insulation.
- Keep the cables well away from heat sources, as bare conductors could be exposed if the insulation melts.
- To avoid damaging the sensor cable, do not bend or pull the cable.
- Note that the product may be damaged if current exceeding the selected measurement range is applied for a long time

## Measurement Procedure

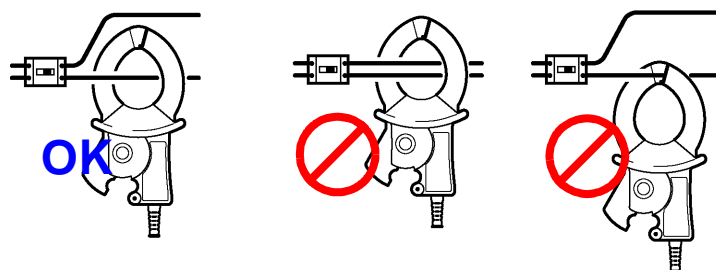
### ⚠CAUTION

- When disconnecting the BNC 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 connector.
- To prevent damage to the product and sensor, never connect or disconnect a sensor while the power is on, or while the sensor is clamped around a conductor.

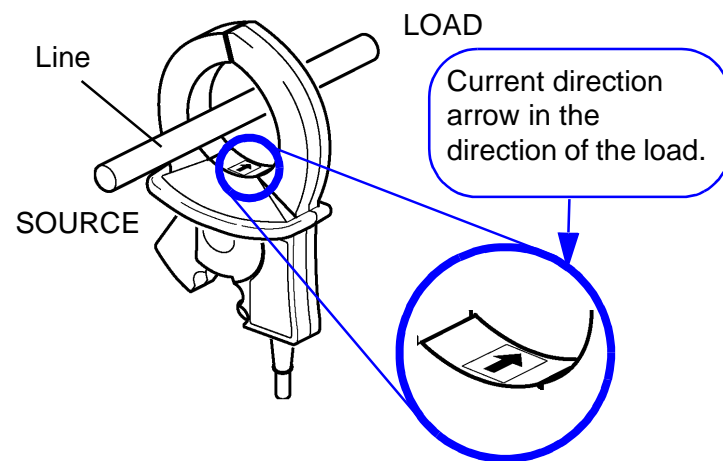
### 1. Load Current Measurement

#### 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.



When making the phases of the measurement current and output voltage the same, clamp the jaws of the sensor onto the conductor so that the current direction on the clamp points in the direction of the load, and so that the conductor is approximately centered between the jaws. Make sure that the tips of jaws are fully closed.



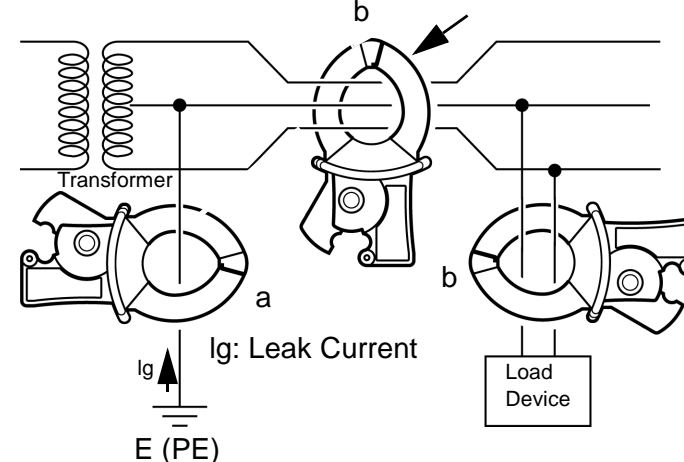
- Align the BNC connector with the connector guide notch on the current input connector. While pushing the connector in, turn it to the right to lock it.
- Open the jaws, and clamp the sensor onto the conductor.
- Make sure that the tips of jaws are fully closed.

### 2. Leak Current Measurement

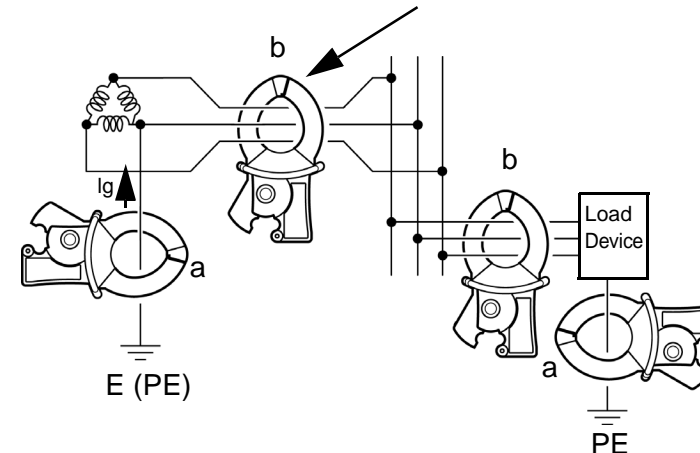
#### Connections method

Clamp the tester on the conductor, so that the conductor passes through the center of the jaw. For measurement of grounded leads, clamp the tester on one lead only (see a). For overall measurements, clamp the tester on the entire circuit path (see b).

#### Single-phase 3-lead circuits



#### Three-phase 3-lead circuits



#### NOTE

- For measurement of single-phase 2-lead circuits, clamp both leads of the circuit.
- For measurement of three-phase 4-lead circuits, clamp all four leads of the circuit. If this is not possible, the measurement can also be carried out on the ground lead of the equipment.
- If a strong current (on the order of 100 A) is flowing in an adjacent circuit, accurate measurement may not be possible. Perform the measurement at a sufficient distance from other current-carrying conductors.
- The frequency of special waveforms such as at the secondary side of an inverter may not be indicated correctly.
- Do not input a current which exceeds the rated current.

#### Checking for insulation faults

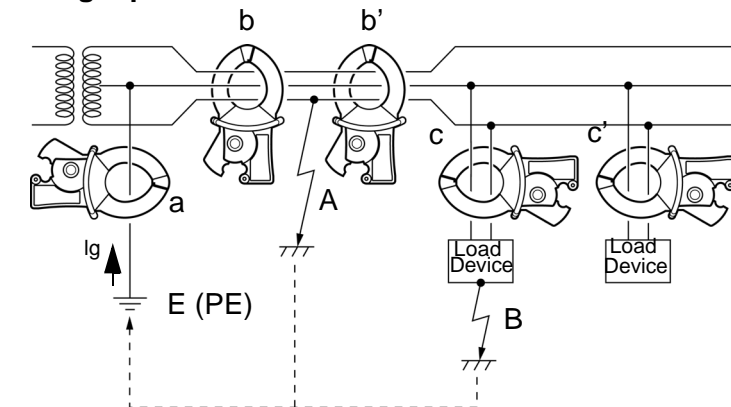
Normally, for a E(PE) grounding installation of a transformer, the measurement will first be made to check for overall circuit leak current in the ground lead (a). Current changes can be used to diagnose the leak current condition. When leak current has been detected, the measurement should proceed from the power source towards the load, using overall measurement.

1.If an insulation fault in the wiring has occurred at position A in the illustration, leak current will be detected at position b using overall measurement, but not at position b'.

2.If an insulation fault in the load equipment has occurred at position B in the illustration, leak current will be detected at position c using overall measurement, but not at position c'.

3.For detection of intermittent leak current conditions (such as only when a certain piece of equipment is operating), the use of a level recorder will be helpful.

#### Single-phase 3-lead circuits



## Parts Names

