

# L2002

## CLIP TYPE PROBE

### Instruction Manual

EN

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# HIOKI

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#### Warranty Certificate

**HIOKI**

Model	Serial number	Warranty period
		One (1) year from date of purchase ( ___ / ___ )
Customer name: _____		
Customer address: _____		
<b>Important</b>		
Please retain this warranty certificate. Duplicates cannot be reissued. Complete the certificate with the model number, serial number, and date of purchase, along with your name and address. The personal information you provide on this form will only be used to provide repair service and information about Hioki products and services.		
This document certifies that the product has been inspected and verified to conform to Hioki's standards. Please contact the place of purchase in the event of a malfunction and provide this document, in which case Hioki will repair or replace the product subject to the warranty terms described below.		
<b>Warranty terms</b>		
1. The product is guaranteed to operate properly during the warranty period (one [1] year from the date of purchase). If the date of purchase is unknown, the warranty period is defined as one (1) year from the date (month and year) of manufacture (as indicated by the first four digits of the serial number in "YYMM" format).		
2. If the product came with an AC adapter, the adapter is warranted for one (1) year from the date of purchase.		
3. The accuracy of measured values and other data generated by the product is guaranteed as described in the product specifications.		
4. In the event that the product or AC adapter malfunctions during its respective warranty period due to a defect of workmanship or materials, Hioki will repair or replace the product or AC adapter free of charge.		
5. The following malfunctions and issues are not covered by the warranty and as such are not subject to free repair or replacement:		
-1. Malfunctions or damage of consumables, parts with a defined service life, etc. -2. Malfunctions or damage of connectors, cables, etc. -3. Malfunctions or damage caused by shipment, dropping, relocation, etc., after purchase of the product -4. Malfunctions or damage caused by inappropriate handling that violates information found in the instruction manual or on precautionary labeling on the product itself -5. Malfunctions or damage caused by a failure to perform maintenance or inspections as required by law or recommended in the instruction manual -6. Malfunctions or damage caused by fire, storms or flooding, earthquakes, lightning, power anomalies (involving voltage, frequency, etc.), war or unrest, contamination with radiation, or other acts of God -7. Damage that is limited to the product's appearance (cosmetic blemishes, deformation of enclosure shape, fading of color, etc.) -8. Other malfunctions or damage for which Hioki is not responsible		
6. The warranty will be considered invalidated in the following circumstances, in which case Hioki will be unable to perform service such as repair or calibration:		
-1. If the product has been repaired or modified by a company, entity, or individual other than Hioki -2. If the product has been embedded in another piece of equipment for use in a special application (aerospace, nuclear power, medical use, vehicle control, etc.) without Hioki's having received prior notice		
7. If you experience a loss caused by use of the product and Hioki determines that it is responsible for the underlying issue, Hioki will provide compensation in an amount not to exceed the purchase price, with the following exceptions:		
-1. Secondary damage arising from damage to a measured device or component that was caused by use of the product -2. Damage arising from measurement results provided by the product -3. Damage to a device other than the product that was sustained when connecting the device to the product (including via network connections)		
8. Hioki reserves the right to decline to perform repair, calibration, or other service for products for which a certain amount of time has passed since their manufacture, products whose parts have been discontinued, and products that cannot be repaired due to unforeseen circumstances.		
<b>HIOKI E.E. CORPORATION</b> <a href="http://www.hioki.com">http://www.hioki.com</a>		18-07 EN-1

### Introduction

Thank you for purchasing the HIOKI L2002 Clip Type Probe. To obtain maximum performance from the product please read this manual first, and keep it handy for future reference.

## Inspection/Maintenance

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 authorized Hioki distributor or reseller.

### Preliminary checks

#### ⚠ WARNING

Before using the product, ensure that the insulation on the probes are not damaged and conductors are not exposed. Using the product in such conditions could cause an electric shock, so contact your authorized Hioki distributor or reseller for repair.

### Maintenance and service

#### IMPORTANT

Never use cleaning agents containing benzene, alcohol, acetone, ether, ketones, thinners or gasoline. These can deform and discolor the case.

- To clean the product, wipe it gently with a soft cloth moistened with water or mild detergent.
- If the product seems to be malfunctioning, contact your authorized Hioki distributor or reseller. Pack the product so that it will not get damaged during shipping, and include a description of existing damages. Hioki cannot be responsible for damage that occurs during shipment.

### Disposal

Handle and dispose of the product in accordance with local regulations.

## Operating Precautions

Installing the product in inappropriate locations may cause the probe to malfunction or lead to accidents. Please do not install in the following locations. For details on the operating temperature and humidity, see the specifications.

#### ⚠ WARNING

- Exposed to direct sunlight or high temperatures
- Exposed to corrosive or combustible gases
- Exposed to strong electromagnetic fields or electrostatic charges
- 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

#### ⚠ CAUTION

- ⚠ The ends of the probes are sharp. Be careful to avoid injury.
- ⚠ To prevent probe damage, do not step on probes or pinch them between other objects. Do not bend or pull on probes at their base.

## Safety Information

Before using the product, be certain to carefully read the following safety notes.

#### ⚠ WARNING

- Customers are not allowed to modify, disassemble, or repair the instrument. Failure to observe these precautions may result in fire, electric shock, or injury.
- ⚠ Ensure that the input does not exceed the maximum input voltage or current to avoid product damage resulting from heat building. Excessive voltage and current can cause the product to malfunction.

#### ⚠ CAUTION

- 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.
- ⚠ If persons unfamiliar with electricity measuring product are to use the product, another person familiar with such instruments must supervise operations.

### Safety symbols

	Indicates cautions and hazards. When the symbol is printed on the product, refer to a corresponding topic in the Instruction Manual.
	Indicates DC (Direct Current).

### Notation

In this manual, the risk seriousness and the hazard levels are classified as follows.

	<b>WARNING</b>	Indicates a potentially hazardous situation that may result in death or serious injury to the operator.
	<b>CAUTION</b>	Indicates a potentially hazardous situation that may result in minor or moderate injury to the operator or damage to the product or malfunction.
	<b>IMPORTANT</b>	Indicates information related to the operation of the product or maintenance tasks with which the operators must be fully familiar.
		Indicates a prohibited action.
		Indicates actions which must be performed.

## Overview

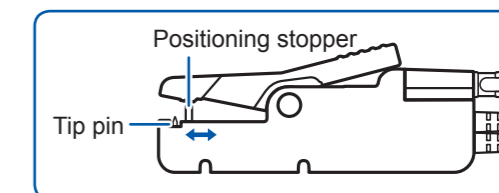
L2002 Clip Type Probes are four-terminal probes suitable for measuring laminate type batteries. The same clipping depth can be always maintained by using a positioning stopper.

## Specifications

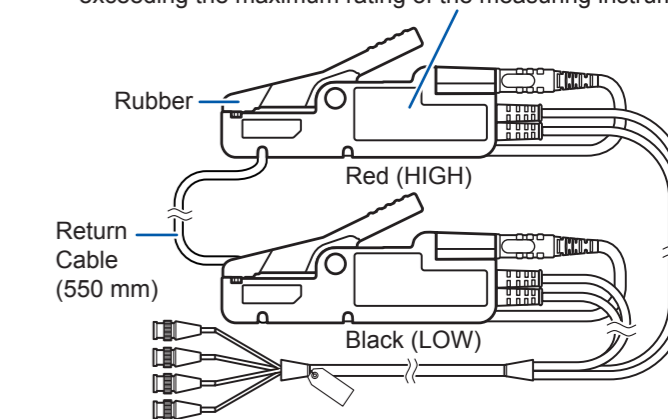
Measurable frequency range	DC to 1050 Hz
Maximum rated voltage	30 V peak
Maximum rated current	2.5 A peak
Structure	Four-terminal pair connection structure
Length	Approx. 1500 mm (59.06")
Mass	Approx. 220 g (7.8 oz.)
Cable used	50 Ω Coaxial cable

Terminal structure	Gold-plated process Tip shape: spherical surface Used tip pin can be replaced.
Distance between pins	6.3 mm (0.25")
Operating temperature and humidity	Temperature; 0°C to 40°C (32°F to 104°F), Humidity; 80% RH or less (no condensation)
Storage temperature and humidity	Temperature; -10°C to 50°C (14°F to 122°F), Humidity; 80% RH or less (no condensation)
Operating environment	Indoors, Pollution degree 2, altitude up to 2000 m (6562 ft.)
Product warranty period	1 year
Accessories	Return Cable (400 mm) Return Cable (550 mm) Return Cable (800 mm) Instruction Manual

## Part Names



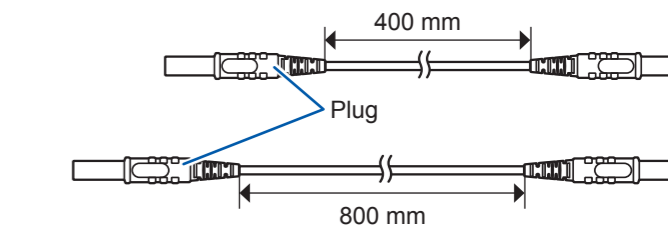
⚠ Probe's maximum rating is 30 V, but be careful to avoid exceeding the maximum rating of the measuring instrument.



#### IMPORTANT

Return Cable (550 mm) is shipped in a state connected to the instrument.

#### Accessories

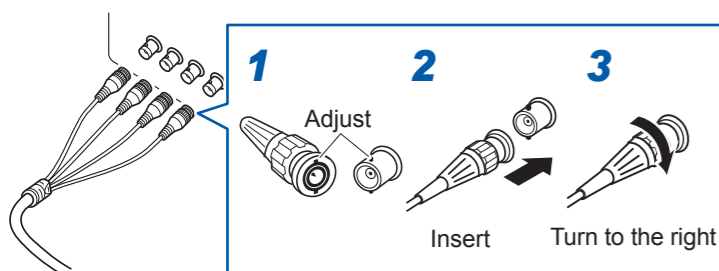


## Connection Method

#### IMPORTANT

Clean the tip of the tip pin and the surface of the measuring object before zero adjustment and measurement.

## Connecting to the instrument

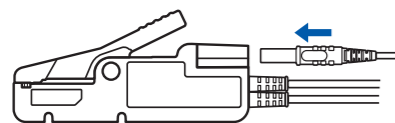


## Connecting the return cable

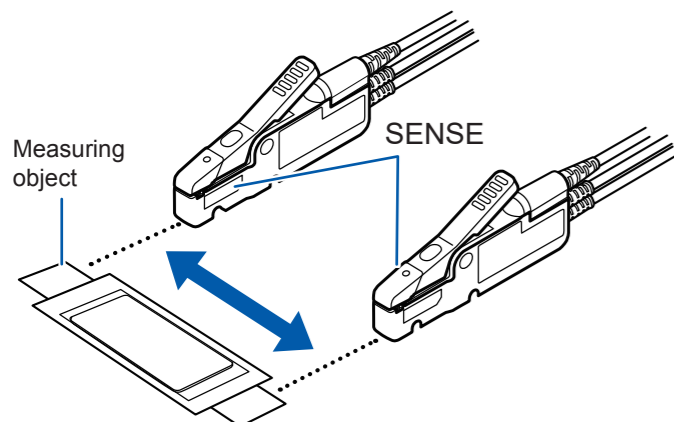
### IMPORTANT

- Connect the return cable before measurement.
- Adjust the fixed position of the probe so that the return cable between the probes does not sag.

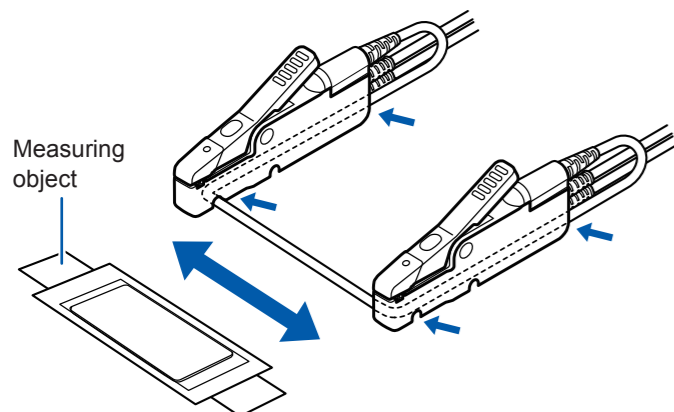
- 1 Securely insert the plug of the return cable up to the back of the probe (both red and black).



- 2 Arrange the probes so that the distance between the SENSE of the probes is the same as the actual object to be measured with the SENSE of the probes (both red and black) facing inwards.

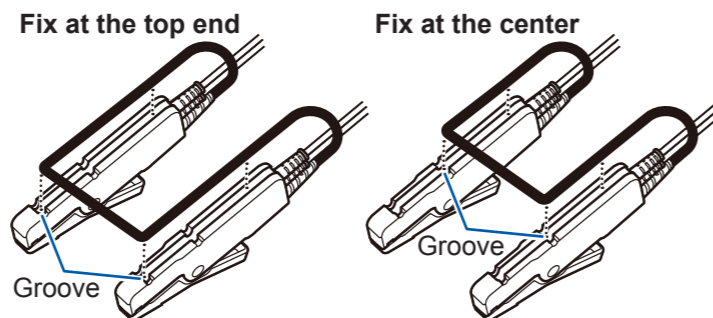


- 3 Adjust the position of the probes such that the return cable between the probes does not sag, and fix by pushing the return cable into the grooves of the probes.



If the measurement is difficult, fixing can be done at the center. However, effectiveness of noise cancellation will reduce. (The return cable is indicated black in the illustration.)

### When viewed from the bottom



Use a cable of suitable length for the distance between the terminals of the measuring object from the three types of accessory cables.

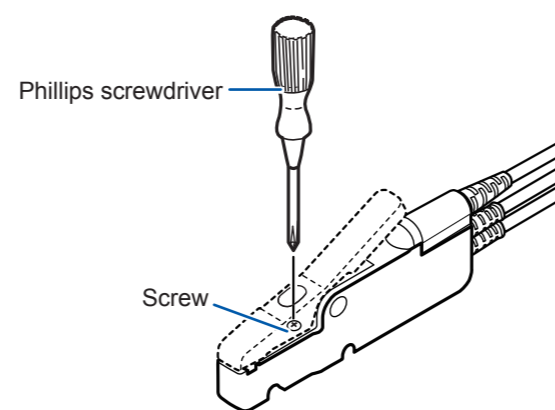
Return cable length	Distance between the terminals of the measuring object
400 mm	100 mm or less
550 mm (mounted before shipment)	100 mm to 250 mm
800 mm	250 mm to 500 mm

## Adjustment Method for the Positioning Stopper

If the resistance of the measuring object is low, the contact position of the probes will affect the measured values. A positioning stopper is provided so that clipping can be always achieved at the same depth. Adjust the stopper position for each measuring object.

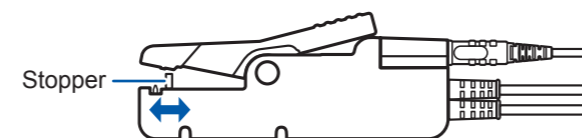
<Tools to be prepared> One Phillips screwdriver

- 1 Loosen the screw holding the stopper with the Phillips screwdriver (Screw size: M2 × 6 mm)



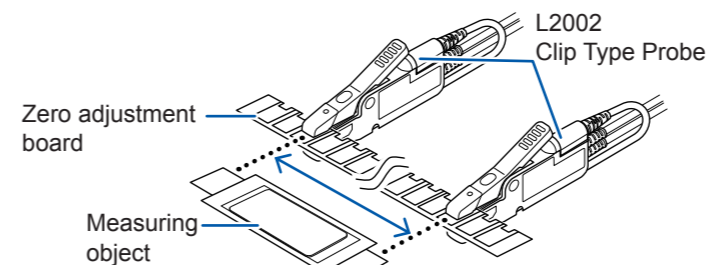
- 2 Adjust the stopper position by moving the stopper back and forth and tighten the screw.

The stopper position can be selected from five levels.

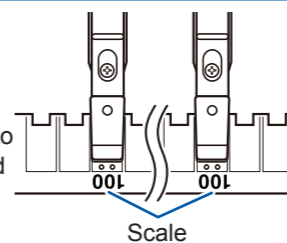


## Zero Adjustment

Clip the zero adjustment board which is provided with the connection instrument to execute zero adjustment. Clip with the same width scale as the measuring object, and carry out zero adjustment with the connected instrument.



Select scales with the same number of scale divisions to both the HIGH and LOW terminals.



### IMPORTANT

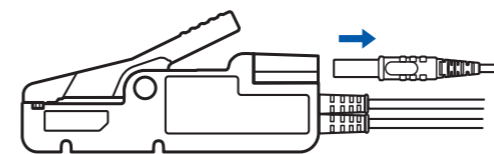
Ensure that the return cable between the probes does not sag.

## Replacing the Used Tip Pin

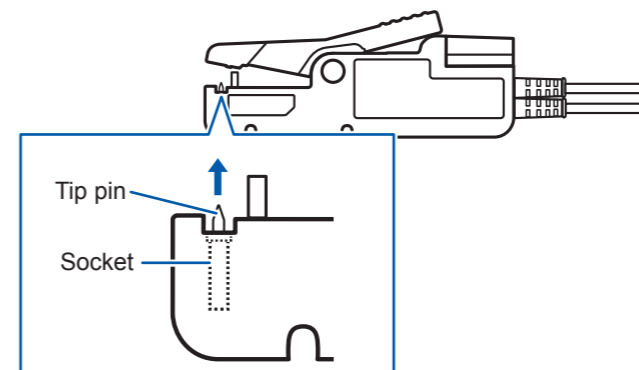
Replace the used tip pin with a new one when the tip pin breaks or is worn out. To purchase the tip pin, contact your authorized Hioki distributor or reseller.

<Tools to be prepared> Tip pin, pliers, etc.

- 1 Turn off the power to the connected instrument and remove the return cables of the probes.



- 2 Grip the tip pin to be replaced with the pliers and pull it out in the upward direction.

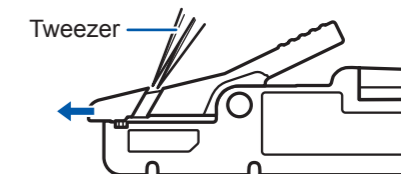


- 3 Insert a new tip pin in the socket and push it in completely.
- 4 Measure a known measuring object to check if the measured value is correct.

## Replacing the Rubber

Replace the used rubber with a new one when the rubber is broken or is worn out. To purchase the rubber, contact your authorized Hioki distributor or reseller.

<Tools to be prepared> A pair of tweezers, etc. Place a pair of tweezers between the rubber and probe. Slide aside the rubber to remove. (Refer to the illustration below.)



## Four-terminal Pair Method

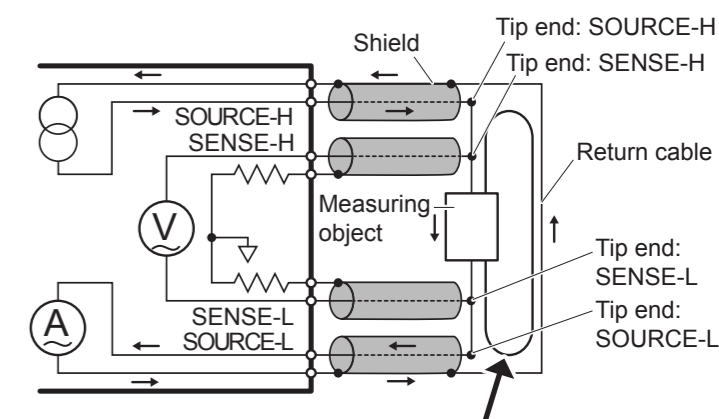
L2002 uses the four-terminal pair method as the measurement method.

### Four-terminal pair method

In the four-terminal pair method, the current flows backward (current returns) with the same magnitude as the measuring current in the shields of the SOURCE cables, and then cancels the magnetic field of the measuring current. This method suppresses the induced electromotive force induced at the SENSE terminals, and detects the voltage actually generated in the object being measured.

### Four-terminal pair method when using the optional probe

When the L2002 is used, the four-terminal pair method is structured as described below. Vicinity of the measurement object will not entirely be four-terminal pair, and will be affected by an inductive magnetic field. The shape of the return cable should not be changed, and kept away from metals when use. (When there are metals, inductive magnetic field occurs due to eddy current, and leads to measurement errors.)



- Keep the loop area between the return cable and measurement object as small as possible.
- Keep the loop shape and wiring position always the same.
- Keep away from metals.

### When the measurement value fluctuates

Keep the return cable in shape, or the affects of the magnetic field changes and the measurement value may fluctuate. Twist the return cable to keep a fixed shape. (The return cable is indicated black in the illustration.)

