HIOKI

L2003

PIN TYPE PROBE

Instruction Manual

EN

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HIOKI

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All regional contact information

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Warranty Certificate HIOKI

Model	Serial number	Warranty period One (1) year from date of purchase (___ / ___)

Customer name: _____
Customer address: _____

Important
- 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.

Warranty terms

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 warrantied 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.

HIOKI E.E. CORPORATION
http://www.hioki.com 18-07 EN-1

Introduction

Thank you for purchasing the HIOKI L2003 Pin 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 could result in malfunction of the probe. 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.

⚠ WARNING	Indicates a potentially hazardous situation that may result in death or serious injury to the operator.
⚠ CAUTION	Indicates a potentially hazardous situation that may result in minor or moderate injury to the operator or damage to the product or malfunction.
IMPORTANT	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

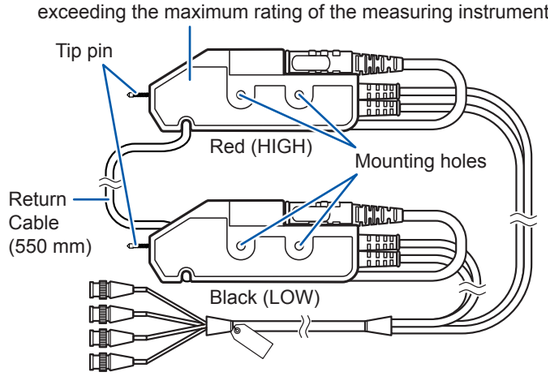
L2003 Pin Type Probe is a four-terminal probe. The probe can be used to contact various types of batteries since the measuring unit is pin shaped.

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. 200 g (7.1 oz.)
Cable used	50 Ω Coaxial cable
Terminal structure	Gold plating process Tip shape: Needle Used tip pin can be replaced.
Distance between pins	2.5 mm (0.10″)
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
Option	9772-90 Tip Pin

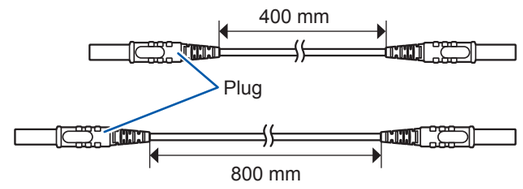
Part Names

⚠ 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.

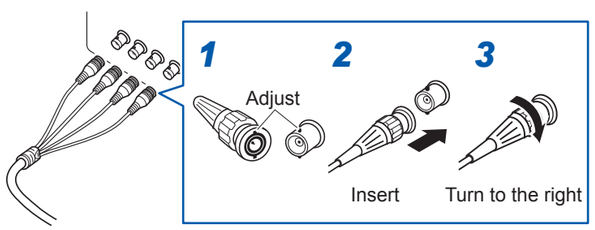
Accessories



Connection Method

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

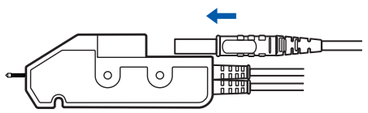
Connecting to the instrument



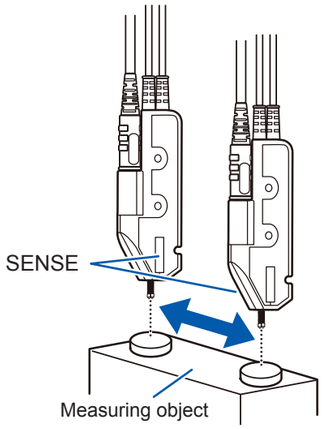
Connecting the return cable

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).**

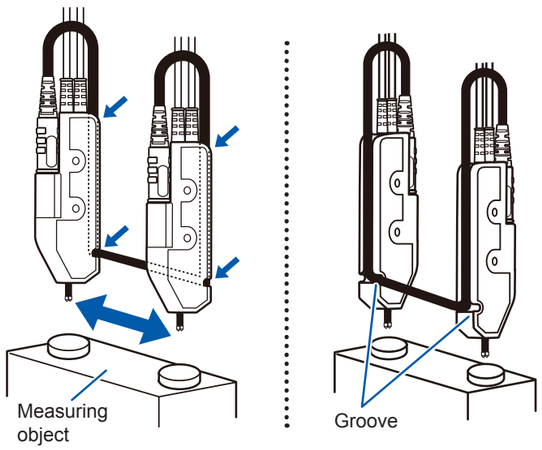


2 **Arrange the probes so that the distance between the pin tips of the probe is the same as that between the terminals of the actual measuring object, with the SENSE sides of the probes (both red and black) facing inwards.**



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.**

When viewed from the front **When viewed from the rear**



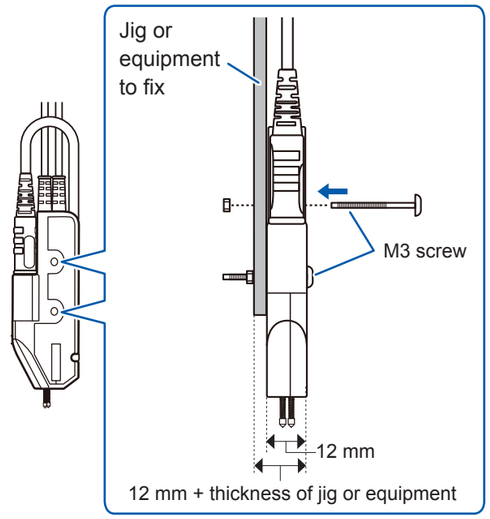
(The return cable is indicated black in the illustration above.)

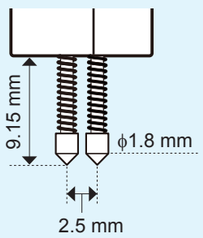
Use a cable of suitable length for the distance between the terminals of the measuring object from the three types of accessory cables.

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

Fixing Using the Mounting Holes

The probe can be fixed using the mounting holes. (Please prepare your own jig or equipment to fix.)
Hole diameter: 3.2 mm, use a M3 screw.

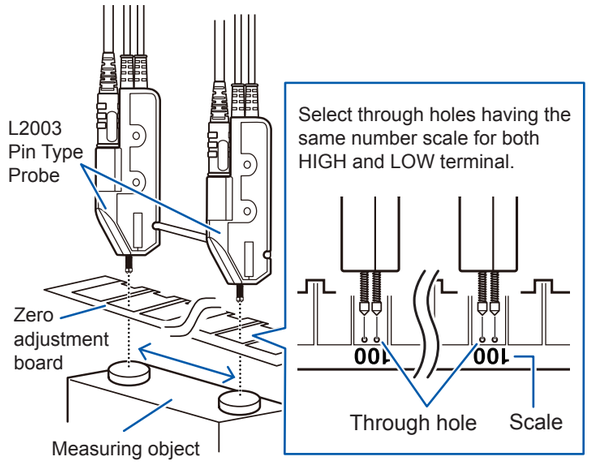




First contact pressure:	Approx. 60 g
Full stroke:	3 mm±0.2 mm (condensing pressure approx. 230 g)
Recommended stroke:	2 mm (condensing pressure approx. 170 g)

Zero Adjustment

Execute the zero adjustment using the zero adjustment board provided with the connected instrument.
Insert the tip pins of the probes into through holes having the same width as the terminals of the measuring object, and carry out the zero adjustment with the connected instrument.



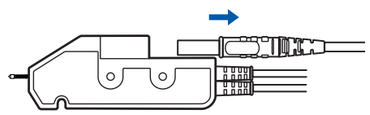
IMPORTANT
- Adjust the return cable between the terminals so that it does not sag.
- If there is no through hole with the same width as the terminals of the measuring object, perform zero adjustment with the most nearest width scale of the through hole as the terminals.
- Perform zero adjustment by facing the probe's (both red and black) SENSE side inwards.

Replacing the Used Tip Pin

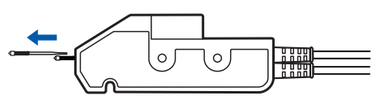
Replace the used tip pin with a new one when the tip pin breaks or is worn out. To purchase Model 9772-90 Tip Pin for replacement, contact your authorized Hioki distributor or reseller.

<Tools to be prepared> Model 9772-90 Tip Pin, pliers, etc.

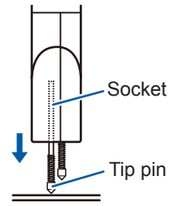
1 **Turn off the power to the connected instrument and remove the return cables of the probes.**



2 **Grip the tip pin to be replaced with pliers and pull it out.**



3 **Insert a new tip pin in the socket, and securely push to the back by pressing with a hard board so that the tip pin does not fly out.**



4 **Measure a known measuring object to check if the measured value is correct.**

Four-terminal Pair Method

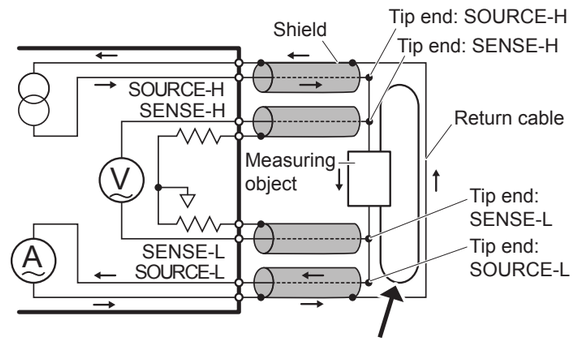
L2003 uses the four-terminal pair method as the measurement method.

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 L2003 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 flactuate.
Twist the return cable to keep a fixed shape.
(The return cable is indicated black in the illustration.)