= HIOKI

L2003

PIN TYPE PROBE

Instruction Manual

EN

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HIOKI

http://www.hioki.com

HEADQUARTERS

Ueda, Nagano 386-1192 Japan

HIOKI EUROPE GmbH 81 Koizumi

65760 Eschborn, Germany hioki@hioki.eu

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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		
about Hioki produ This document certifie Please contact the pla	cts and services. s that the product has been inspecte	s form will only be used to provide repair service and information ed and verified to conform to Hicki's standards. Ifunction and provide this document, in which case Hicki will s described below.
Warranty terms		
If the date of purcha		ne warranty period (one [1] year from the date of purchase). is defined as one (1) year from the date (month and year) of serial number in YYMM format).
		warrantied for one (1) year from the date of purchase.
The accuracy of me specifications.	asured values and other data gener	rated by the product is guaranteed as described in the product
4. In the event that the	product or AC adapter malfunction	s during its respective warranty period due to a defect of

- n une event mat me product or AL adapter malfunctions during its respective warranty period d workmanship or materials, Hioki Will repair or replace the product or AC adapter free of charge. The following malfunctions and issues are not covered by the warranty and as such are not sub

- The following manuritums and second and interplacement:

 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 produc definitions or damage caused by shipment, dropping, relocation, etc., after purchase of the produc definitions or damage caused by inappropriate handling that violates information found in the instruence on procautionary labeling on the product listed of the product listed of the product listed of the instruction and the product listed of the instruction manual of the product listed of the instruction of the product listed of the instruction manual of the product listed of the instructions or damage caused by fire, storms or flooding, earthquakes, lightning, power anomalies
- Damage that is limited to the product's appearance (cosmetic blemishes, deformation of end
- -8. Other malfunctions or damage for which Hioki is not responsible The warranty will be considered invalidated in the following circumstances, in which case Hioki will be

- 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 (aerospa
 unclear power, medical use, vehicle control, etc.) without Hioki's having received prior notice

 If you experience a loss caused by use of the product and Hioki determines that it is responsible for the under
 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 t
 -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)

- fing via network connections)
 rives the right to decline to perform repair, calibration, or other service for products for which a certain
 s passed since their manufacture, products whose parts have been discontinued, and products that c

HIOKI E.E. CORPORATION

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.

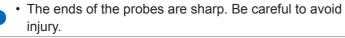
Operating Precautions

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.

MARNING

- · 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 highfrequency 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

ACAUTION



· 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.

ACAUTION

- · 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.

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Indicates DC (Direct Current).

Notation

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



Indicates a potentially hazardous situation that may result in death or serious injury to the operator.



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.

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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 DC to 1050 Hz range 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

HIOKI L2003A981-01

Gold plating process Tip shape: Needle Used tip pin can be replaced. Distance between pins 2.5 mm (0.10") Operating temperature Temperature; 0°C to 40°C (32°F to 104°F), and humidity Humidity; 80% RH or less (no condensation) Temperature; -10°C to 50°C (14°F to 122°F), Storage temperature Humidity; 80% RH or less (no condensation) and humidity Operating environment Indoors, Pollution degree 2, altitude up to 2000 m (6562 ft.) Product warranty 1 year period Return Cable (400 mm) Accessories

Return Cable (550 mm)

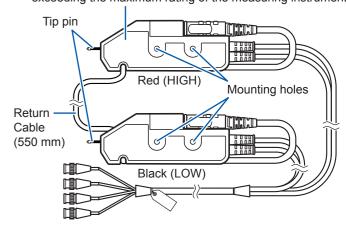
Return Cable (800 mm)

Instruction Manual

9772-90 Tip Pin

Part Names

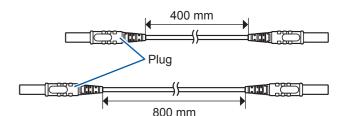
⚠ Probe's maximum rating is 30 V, but be careful to avoid exceeding the maximum rating of the measuring instrument



IMPORTANT

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

Accessories

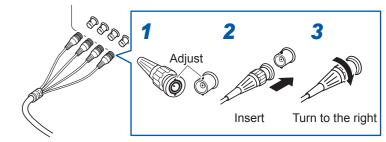


Connection Method

IMPORTANT

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

Connecting to the instrument

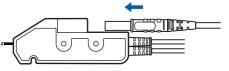


www.valuetronics.com

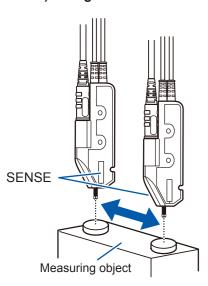
Connecting the return cable

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).



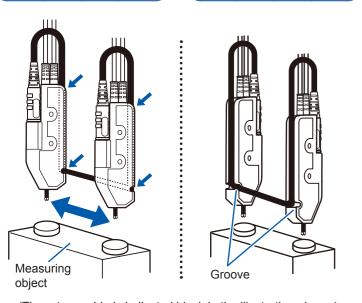
Arrange the probes so that the distance between the pin tips of the probe is the same as that between the terminals of the actual measuring object, with the SENSE sides of the probes (both red and black) facing inwards.



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



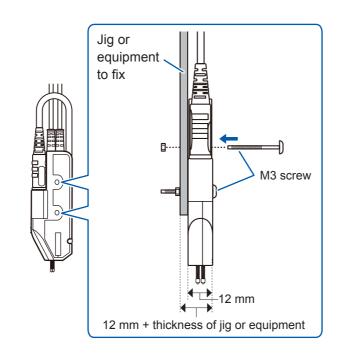
(The return cable is indicated black in the illustration above.)

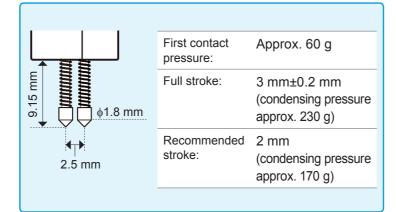
Use a cable of suitable length for the distance between the terminals of the measuring object from the three types of accessory cables.

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.

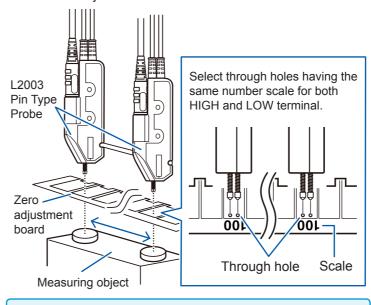




Zero Adjustment

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

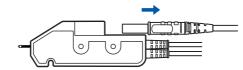
- Adjust the return cable between the terminals so that it does not sag.
- If there is no through hole with the same width as the terminals of the measuring object, perform zero adjustment with the most nearest width scale of the through hole as the terminals
- Perform zero adjustment by facing the probe's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

Replacing the Used Tip Pin

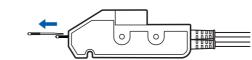
Replace the used tip pin with a new one when the tip pin breaks or is worn out. To purchase Model 9772-90 Tip Pin for replacement, contact your authorized Hioki distributor or reseller

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

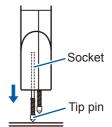
1 Turn off the power to the connected instrument and remove the return cables of the probes.



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



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.



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

Four-terminal Pair Method

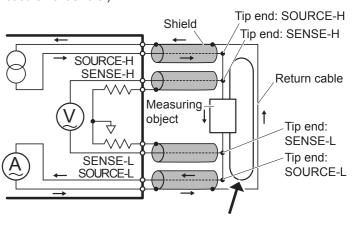
L2003 uses the four-terminal pair method as the measurement method.

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.

