HIOKI

P9000-01
P9000-02

DIFFERENTIAL PROBE

Instruction Manual

EN

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HIOKI

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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 three (3) years 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 choosing the Hioki P9000-01, P9000-02 Differential Probe. Preserve this manual carefully and keep it handy to make full use of this product for along time.

Overview

The product is a differential probe that is connected to a Memory HiCorder input unit. The probe divides two high voltages input to its high and low terminals by 100 or 1000 and then outputs the difference as a signal relative to ground. The P9000-02 includes AC RMS value output functionality.
Power can be supplied via the optional AC adapter or a commercially available USB cable.

Verifying Package Contents

When you open the package, carefully inspect the product to ensure that everything is in good condition, and that no damage occurred during shipping. Carefully check the accessories and connectors.
If the product seems to have been damaged or does not work as specified, contact your authorized Hioki distributor or reseller.

Cleaning

If the product becomes dirty, slightly moisten a soft cloth moistened with water or a neutral detergent and wipe the product clean.

IMPORTANT
Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

Repair

If the product seems to be malfunctioning, confirm that the AC adapter and the USB cable are connected properly before contacting your authorized Hioki distributor or reseller.

WARNING

Touching any of the high-voltage points inside the product is very dangerous. Do not attempt to modify, disassemble, or try to repair the product. Doing so may cause a fire, electric shock, or injury.

Calibration

IMPORTANT
Periodic calibration is necessary in order to ensure that the instrument provides correct measurement results of the specified accuracy.

The calibration period varies with the conditions and environment of use. It is recommended to determine a calibration period based on those factors and to have the product regularly calibrated by Hioki. Please contact your Hioki distributor to have your product periodically calibrated.

Precautions during shipment

Be sure to follow these precautions when transporting the product:
- Remove accessories and optional equipment from the product in order to avoid damage. Additionally, be sure to double box the product. Accidental damage suffered in transit is not covered by the warranty.
- Attach a description of the issue when sending out your product for repair.

Disposal

Dispose of the product in accordance with local regulations.

Safety Notes

This product is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, using the product in a way not described in this manual may negate the provided safety features.
Carefully read the following safety notes before using the product.

WARNING

Mishandling product could result in bodily injury or even death, as well as damage to the product. Familiarize yourself with the instructions and precautions in this manual before using the product.

WARNING

- **Protective Gear**
  Performing measurement using this product involves live-line work. To prevent an electric shock, use appropriate protective insulation and adhere to applicable laws and regulations.
- **Electricity can potentially cause serious events such as an electric shock, heat generation, fire, and an arc flash due to a short-circuit. If you have not used electrical measuring instrument before, you should be supervised by a technician who has experience in electrical measurement.**

Notations

In this document, the severity levels of risk and hazard are classified as follows.

DANGER	Indicates an imminently hazardous situation that will result in death of or serious injury to the operator.
WARNING	Indicates a potentially hazardous situation that may result in death of 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 or content that is particularly important from the standpoint of operating or maintaining the product.
⚠	Indicates cautions and hazards. When the symbol is printed on the product, refer to a corresponding topic in the Instruction Manual.
|	Indicates the ON side of the power switch.
○	Indicates the OFF side of the power switch.
⏚	Indicates a grounding terminal.
⎓	Indicates DC (Direct Current).
⊘	Indicates an action that must not be performed.
❗	Indicates action that must be performed.
CE	Indicates that the product conforms to regulations required by the EU Directive.
	Indicates the Waste Electrical and Electronic Equipment Directive (WEEE Directive) in EU member states.

Measurement categories

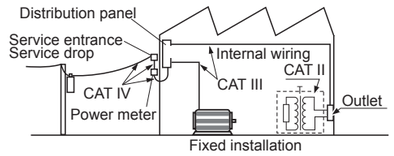
To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

WARNING

- **Using a measuring product in an environment designated with a higher-numbered category than that for which the product is rated could result in a severe accident, and must be carefully avoided.**
- **Never use a measuring product that lacks category labeling in a CAT II to CAT IV measurement environment. Doing so could result in a serious accident.**

This product conforms to the safety requirements for CAT III 1000 V, CAT IV 600 V measuring instruments.

CAT II: When directly measuring the electrical outlet receptacles of the primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
CAT III: When measuring the primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets
CAT IV: When measuring the circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel)



Usage Notes

Observe the following precautionary information to ensure that the product can be used safely and in a manner that allows it to perform as described in its specifications.

WARNING

To prevent an electric shock, confirm that the white or red portion (insulation layer) inside the cable is not exposed. If a color inside the cable is exposed, do not use the cable.

WARNING

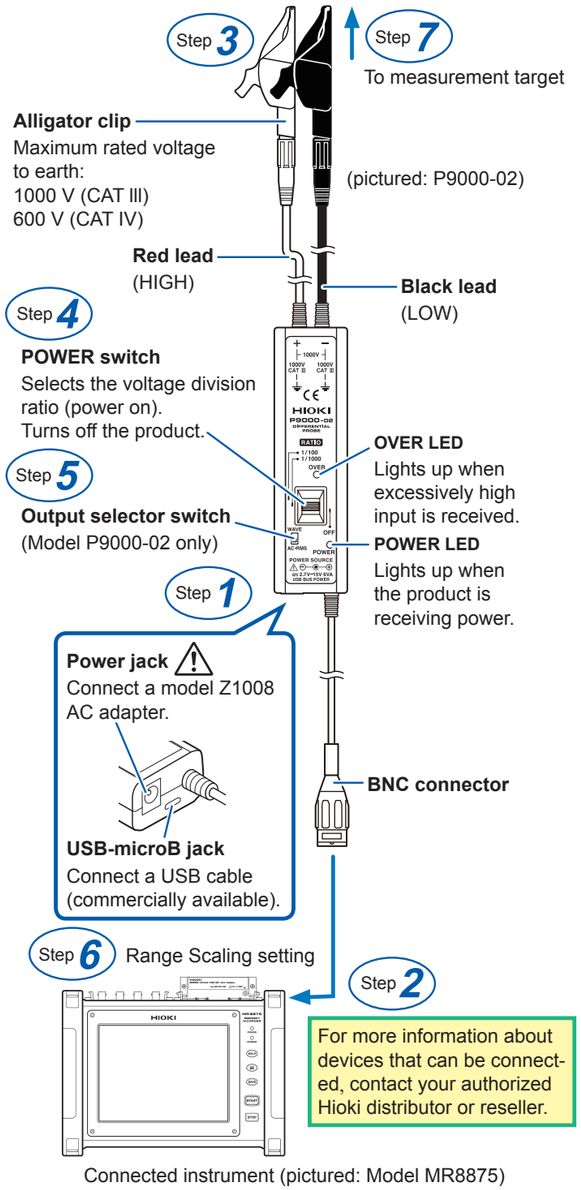
Do not allow the product to get wet, and do not take measurements with wet hands. This may cause an electric shock.

CAUTION

- To avoid damage to the product, avoid subjecting it to vibration or mechanical shock during transportation and handling. Exercise particular care to avoid subjecting the product to mechanical shock, for example by dropping.
- Do not store or use the product where it could be exposed to direct sunlight, high temperatures or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This product is not designed to be entirely waterproof or dustproof. Do not use it in an especially dusty environment, nor where it might be splashed with liquid. This may cause damage.

This product complies with EN 61326 Class A.
This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Parts Names



Connected instrument (pictured: Model MR8875)

Inspection Before Use

To ensure that the product is properly operating, conduct an inspection and check product operation before using product to ensure that no damage has occurred during storage or transport. If there is any damage to the product, contact your authorized Hioki distributor or reseller for repair.

WARNING

Confirm that the insulation on the using the probes are undamaged and that no bare conductors are improperly exposed before using the product. If there is any damage to the product that leads to an electric shock, contact your authorized Hioki distributor or reseller for repair.

Measurement Method

WARNING

- **For your safe operation, do not connect the product to the primary of the distribution panel.**
- **Do not connect the product to a voltage or current that exceeds the rating indicated on the product labeling or the measurement range indicated in its specifications. Doing so may damage the product or cause it to become hot, resulting in electric shock or bodily injury.**
- **To avoid short circuits and electric shock, do not short-circuit two wires to be measured by bringing the metal part of the test lead into contact with them. Never touch the metal end.**

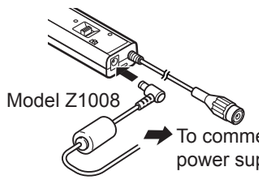
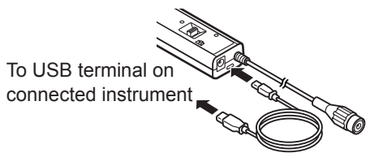
WARNING

When supplying power through the USB-micro B jack, make sure that the USB ground pin of the power source is connected to the ground. Using an ungrounded USB terminal could cause an electric shock.

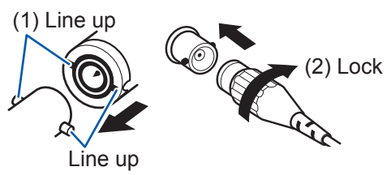
CAUTION

To prevent damage to the connector, be sure to release the locking mechanism, grip the head of the connector (not the cord), and pull it out.

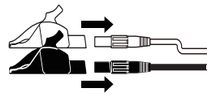
1 Select which of the following two sources you will use to power the product:

Method 1	Connect a model Z1008 AC adapter 
Method 2	Connect a USB cable (commercially available, USB (type A male)↔USB (type B female)) 

2 Connect the product's BNC connector to the input terminal on the connected instrument.



3 Connect the alligator clips to the input leads.



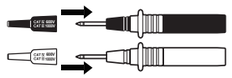
Purchase the tip option that is best suited to the measurement target. These options can be purchased via authorized Hioki distributor or reseller.

CAUTION

Precautions when using the L4932 Test Pin Set

To prevent a short circuit accident, be sure to use the test leads with the sleeves attached when performing measurements in the CAT III measurement category. (For the measurement categories, see "Measurement categories".)

If the sleeves are inadvertently removed during measurement, stop the measurement.



IMPORTANT

Use only the specified tip options. Using a non-specified tip option may result in incorrect measurements due to poor connection or other reasons.

4 Select the voltage division ratio with the POWER switch.

Voltage division ratio	Description
1/1000	Divides the high signal and low signal by 1,000 and then outputs the difference between the two signals as a signal relative to ground.
1/100	Divides the high signal and low signal by 100 and then outputs the difference between the two signals as a signal relative to ground.

5 Select the output type (P9000-02 only).

Output	Description
Wave	Outputs the signal using the selected voltage division ratio. Choose this setting when you wish to view the power supply waveform.
AC-RMS	Outputs the RMS value using the selected voltage division ratio. Input is AC coupled.

6 Set the input range scaling for the connected instrument.

7 Connect the alligator clips to the measurement target.

8 After measurement is complete, turn off the POWER switch.

Specifications

Product warranty period	3 years (except for breaks in cables caused by use)
Accuracy guarantee period	1 year
DC output accuracy	±0.5% f.s. (f.s.=1.0 V (ratio 1000:1), 3.5 V (ratio 100:1))
Temperature characteristic	±0.05% f.s./°C
Frequency characteristic	DC to 100 kHz, -3 dB
Voltage division ratio	1000:1, 100:1 (user-switchable)
Common-mode rejection ratio	80 dB or more (50/60 Hz shorted input)
Input resistance	10.5 MΩ ± 1% (between HIGH and LOW terminals)
Input capacitance	5 pF or less (at 100 kHz)
Input jacks	Banana plug
Output connector	Insulated BNC
Measurable range	1000 V AC/DC (ratio 1000:1) 250 V AC, 350 V DC (ratio 100:1)
Maximum input voltage	1000 V AC/DC
Maximum rated voltage to earth	1000 V AC/DC, measurement category III anticipated transient overvoltage: 8000 V
Operating temperature and humidity	Temperature: -40°C to 80°C/ -40°F to 176°F Humidity: -40°C to 40°C [non-inclusive] / -40°F to 104°F, 80% RH or less 40°C to 45°C [non-inclusive] / 104°F to 113°F, 60% RH or less 45°C to 80°C/ 113°F to 176°F, 50% RH or less (no condensation)
Storage temperature and humidity	Temperature: -40°C to 80°C/ -40°F to 176°F Humidity: 80% RH or less (no condensation)
Operating environment	Indoors, Pollution Degree II, altitude up to 2000 m (6562 ft.)
Dimensions	Approx. 128.0W×36.0H×22.0D mm / Approx. 5.04"W×1.42"H×0.87"D
Mass	Approx. 170 g/ 6.0 oz.
Power supply	(1) Model Z1008 AC adapter (12 V DC, DC jack ϕ5.5×2.1 mm) Rated supply voltage: 100 V AC to 240 V AC (Voltage fluctuations of ±10% from the rated supply voltage are taken into account.) Rated supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V (2) USB bus power (5 V DC USB-microB connector) (3) External power supply, 2.7 V DC to 15 V DC
Maximum rated power	(1) When using a model Z1008 AC Adapter: 6 VA (model P9000-01/-02 with a AC adapter) 0.9 VA (model P9000-01/-02 only) (2) When using a USB bus power: 0.8 VA (3) When using a 15 V DC external power supply: 1 VA
Effect of radiated radio-frequency electromagnetic field	±5% f.s. max. at 3 V/m
Effect of conducted radio-frequency electromagnetic field	±5% f.s. max. at 3 V
Applicable Standards	EMC EN61326 Class A Safety EN61010
Accessories	Instruction manual ×1 Alligator clips×1 set (red and black/ one each) Carrying case×1

Options

The following options are available for the product. To purchase an option, please contact your authorized Hioki distributor or reseller.
Options are subject to change. Please check Hioki's website for the latest information.

Z1008 AC Adapter
9243 Grabber Clip (CAT III 1000 V)
L4936 Bus Bar Clip Set (CAT III 600 V)
L4937 Magnetic Adapter Set (CAT III 1000 V)
L4931 Extension Cable Set (For extending the length of the test leads, 1.5 m)
L4932 Test Pin Set (CAT IV 600 V, CAT III 1000 V)
L4934 Small Alligator Clip Set (CAT III 300 V, CAT II 600 V)
(L4932 is required when using L4934.)

Model P9000-02 only

Measurement modes	Waveform, AC-RMS (selected with a slide switch)
Convertible voltage	1000 V AC (ratio 1000:1), 250 V AC (ratio 100:1)
RMS value measurement accuracy	±1% f.s. (30 Hz to 1 kHz [non-inclusive], sine wave) ±3% f.s. (1 kHz to 10 kHz, sine wave) (f.s.=1.0 V (ratio 1000:1), 2.5 V (ratio 100:1))
RMS value measurement response time	300 ms Rising 0% f.s.→100% f.s. Response time for input from 0% f.s. to 90% f.s. 600 ms Falling 100% f.s.→0% f.s. Response time for input from 100% f.s. to 10% f.s.

f.s. : maximum display value or scale length (This is usually the maximum value of the currently selected range.)