

HIOKI

P2000

DC HIGH VOLTAGE PROBE

Instruction Manual

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HIOKI

HEADQUARTERS

HIOKI EUROPE GMBH

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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 P2000 DC High Voltage Probe. To ensure your ability to get the most out of this device over the long term, please read this manual carefully and keep it available for future reference. Carefully read the separate document entitled "Operating Precautions" before use.

Latest edition of instruction manual

The contents of this manual are subject to change, for example as a result of product improvements or changes to specifications. The latest edition can be downloaded from Hioki's website.

Intended audience

This manual has been written for use by individuals who use the product or provide information about how to use the product. In explaining how to use the product, it assumes electrical knowledge (equivalent of the knowledge possessed by a graduate of an electrical program at a technical high school).

Shipping Precautions

Store the device packaging material after opening the device. Use the original packaging when shipping the device.

Overview

The device is designed to safely measure DC voltages of up to 2000 V DC (CAT III 2000 V). When it is connected to an instrument's input terminals, the voltage of the object under measurement is reduced prior to input, allowing safe measurement of voltages of up to 2000 V DC in equipment such as solar panels.

Symbols and abbreviations

Safety notations

This manual classifies seriousness of risks and hazard levels as described below.

	Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation that could result in minor or moderate injury or potential risks of damage to the equipment, product (or to other property) if not avoided.
	Indicates the presence of a hazard caused by a strong magnet.
	Indicates that the product could interfere with the proper operation of electronic medical devices such as pacemakers.
	Indicates a prohibited action.
	Indicates a mandatory action.

Symbols on the device

	Indicates the presence of a potential hazard. For more information on about locations where this symbol appears on device components, see the "Usage Notes" section, warning messages listed at the beginning of operating instructions, and the accompanying document entitled "Operating Precautions".
	Indicates direct current (DC).
	Indicates the grounding terminal.

Symbols for various standards

	Indicates that the product is subject to the Waste Electrical and Electronic Equipment (WEEE) Directive in EU member nations.
	Indicates that the product complies with standards imposed by EU directives.

Others

	Indicates additional information is described below.
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Safety Information

WARNING

- If using an electrical measuring instrument for the first time, seek instruction from an individual with electrical measurement experience first.
- Failure to do so could cause the user to experience an electric shock.
- Moreover, it could cause serious events such as heat generation, fire, and an arc flash due to a short circuit.

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Protective gear

- Use insulated protective gear.
- The device is designed to measure live wires. Failure to use protective gear could cause the user to experience an electric shock.
- Use of protective gear is prescribed under applicable laws and regulations.

Precautions for Use

Be sure to follow the precautions listed below in order to use the device safely and in a manner that allows it to function effectively.

DANGER

- People with electronic medical devices such as pacemakers should not use the Z5004 or Z5020 Magnetic Strap.
- Keep the magnet strap away from the body.
- If medical electronics may not operate properly and the life of the operator may be put at great risk.

WARNING

- Do not allow the cable to make contact with the line under measurement.
- Mistaking these cables could damage the device or cause the object under measurement to short circuit, resulting in bodily injury.
- Keep magnetic strap out of the reach of children.
- Sawtooth magnets can be a life-threatening. If you inadvertently swallow a magnet, seek medical attention immediately.

CAUTION

- Do not step on cords or allow them to become caught between other objects.
- Doing so may damage insulation, resulting in bodily injury.
- Do not bend or pull on cables at temperatures of 0°C or lower.
- Since cables become rigid, doing so could damage the insulation or cause a wire break, resulting in electric shock.
- Do not subject the device to vibration or mechanical shock while transporting or handling it.
- Do not drop the device.
- Doing so could damage the device.
- Do not drop magnetic strap onto a floor or other surface.
- Do not apply excessive force to magnetic strap.
- Doing so could damage the magnetic strap.
- Do not use a magnetic strap if it has been exposed to water, dust, or condensation.
- Such exposure could cause the magnetic strap to corrode or otherwise degrade. Additionally, it could reduce the strength of the magnet, allowing the product to fall and sustain damage.

CAUTION

- Keep magnetic strap away from magnetic storage media such as floppy disks, magnetic cards, prepaid cards, and tickets.
- Keep the magnetic strap away from precision electronic devices such as computers, television screens, and electronic wristwatches.
- Failure to do so could result in data loss or equipment damage.

Inspecting the Device Before Use

Check the device for any damage that may have occurred during storage or shipping before use. If you find any damage to the device, please contact your authorized Hioki distributor or reseller for repair.

Check Item	Action
• The device is neither damaged nor cracked.	If any damage is found, request repair. Otherwise, there is a risk of receiving an electric shock.
• The internal circuits are not exposed.	
• The coating of probes and cables are neither broken nor frayed, or the whole portion or metal part within the connection cables are not exposed.	
• The terminals are not contaminated with debris.	Remove contamination with a cotton web.
• The coating of connection cables are neither broken nor frayed, or the whole portion or metal part within the connection cables are not exposed.	If any damage is found, replace the cables with those specified by Hioki. Otherwise, there is a risk of receiving an electric shock.
• Connect the probe to a compatible instrument, measure a sample with a known value (for example, a battery or DC voltage generator), and verify that the instrument displays the expected value.	If the instrument does not display proper measured value, the probe may be malfunctioning. Please request repair.

Maintenance and Service

If the device seems to be malfunctioning, contact your authorized Hioki distributor or reseller.

Cleaning

CAUTION

- If the device becomes dirty, wipe the device clean with a soft cloth moistened with water or a neutral detergent.
- Using detergent that contains solvents such as benzene, acetone, ether, ketones, thinners or gasoline could deform and destroy the device, as could wiping it with excessive force.

Shipping Precautions

Observe the following when shipping the device.

CAUTION

- Remove accessories and options from the device.
- Attach a description of the malfunction.
- Use the packaging in which the device was initially delivered and then pack that in an additional box.
- Failure to do so could cause damage during shipment.

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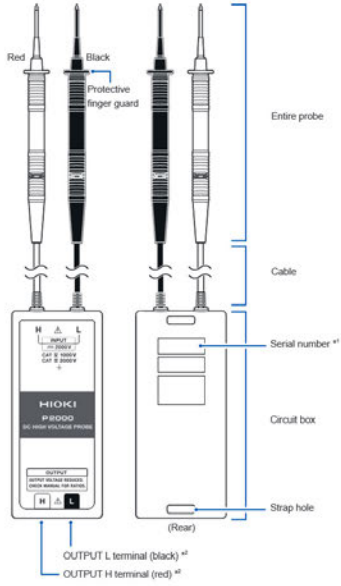
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Part Names



^{*1}: The serial number consists of 9-digit numbers. The first four digits indicate the year (its first two digits omitted) and the month of manufacture. Do not remove this label as the number is important.

^{*2}: Connect the L4943 Connection Cable Set, L4930 Connection Cable Set, or L4931 Extension Cable Set.

Specifications

Accuracy labeling

Reading (display value)
Indicates the value displayed by the instrument. Limit values for reading errors are expressed as a percentage of the reading ("± rdg").

Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	Temperature: -25°C to 65°C (-13.0°F to 149.0°F) Humidity: -25°C to 40°C (-13.0°F to 104.0°F): 80% RH or less (non-condensing) 40°C to 65°C (104.0°F to 149.0°F): Linearly reduces from 80% RH or less at 40°C (104.0°F) to 25% RH or less at 65°C (149.0°F) (non-condensing).
Storage temperature and humidity range	-30°C to 70°C (-22.0°F to 158.0°F), 90% RH or less (non-condensing)
Standards	Safety: EN 61010
Dimensions	Exposed metal area: Approx. 3.7 mm (0.15") (±0.2 mm) Protective finger guard tip: Approx. 42.7 mm (1.68") Entire probe: Approx. 154 mm (6.06") Cable: Approx. 1500 mm (59.06") Circuit box: Approx. 58W × 133H × 220 mm (2.28"W × 5.24"H × 0.87"D)
Weight	Approx. 190 g (6.7 oz.)
Product warranty duration	3 years (excluding entire probe and cable)
Accessories	• L4943 Connection Cable Set • Strap buckle x2 • Strap • C2025 Carrying Case • Instruction manual (this manual) • Operating Precautions (0990A009)
Options	The options listed below are available for the device. To order an option, please contact your authorized Hoki distributor or reseller. Options are subject to change. Please check Hoki's website for the latest information. • L4930 Connection Cable Set (1.2 m) • L4931 Extension Cable Set (1.5 m) • L4943 Connection Cable Set (65 mm) • Z5004 Magnetic Strap • Z5020 Magnetic Strap (Extra strength) • C2025 Carrying Case
Maximum input voltage (Maximum rated voltage between INPUT H and INPUT L)	2000 V DC
Maximum rated line-to-ground voltage	1000 V (Measurement category IV), Anticipated transient overvoltage: 12,000 V 2000 V (Measurement category III), Anticipated transient overvoltage: 15,000 V
Input resistance	20 MΩ ±5.0% (between INPUT H and INPUT L, with OUTPUT terminal open)
Overload protection	2200 V DC/2200 V AC (applied for 1 minute) (Between INPUT H - INPUT L) 600 V DC/600 V AC (applied for 1 minute) (Between OUTPUT H - OUTPUT L)
OUTPUT terminal	4 mm banana terminal
Accuracy guarantee conditions	Accuracy guarantee duration: 1 year Accuracy guarantee temperature and humidity range: 23°C ±5°C (73.0°F ±9.0°F), 80% RH or less (non-condensing) Others: 1.5 m or less of the cable length on the OUTPUT side
Temperature coefficient	Outside the temperature range of 23°C ±5°C, (Accuracy × 0.1)°C is added to the accuracy
Accuracy guarantee range	±80 V DC to ±2000 V DC

Accuracy table for compatible instruments

1. Compatible instruments for which combined accuracy has been defined
-1. Models with DC High V Probe mode

Model	Range	Output ratio	Combined accuracy
DT4261	600.0 V	—	±0.5% rdg ±0.2 V
	2000 V	—	±0.5% rdg ±5 V
CM4141-50, CM4371-50, CM4373-50, CM4375-50	600.0 V	—	±1.0% rdg ±0.3 V
	2000 V	—	±1.0% rdg ±3 V

-2. Models without DC High V Probe mode

Model	Function	Range	Output ratio	Combined accuracy
DT4261, DT4262	DCV	60 000 V	1/10	±0.8% rdg ±0.002 V
		600.0 V	1/10	±0.8% rdg ±0.02 V
DT4251, DT4252, DT4253	DCV	60.00 V	1/10	±1.2% rdg ±0.05 V
		600.0 V	1/10	±1.2% rdg ±0.5 V
DT4254, DT4255, DT4256	DCV	60.00 V	1/10	±1.2% rdg ±0.03 V
		600.0 V	1/10	±1.2% rdg ±0.3 V
CM4371, CM4372, CM4373, CM4374, CM4375, CM4376, CM4141, CM4142	DCV	60.00 V	1/11	±3.0% rdg ±0.03 V
		600.0 V	1/11	±3.0% rdg ±0.3 V

2. Compatible instruments for which output accuracy has been defined

Compatible instruments	Function	Range	Output ratio	Output accuracy (relative to output ratio)
Input resistance 10 MΩ ±5%	DCV	—	1/10	±5.0% output *

* Does not include accuracy of compatible instrument

Making Measurements

WARNING

- Do not use the device to measure AC voltages
The probe cannot accurately measure AC voltages. Improper measurement could lead to electric shock. You can use the device for DC voltage measurement only.
- Do not measure DC voltages in excess of 2000 V.
Doing so could cause damage to the device and measuring instrument, resulting in bodily injury.

CAUTION

- When using the L4943 Connection Cable Set (included), do not subject the cable or plug to a mechanical load.
Doing so could cause the cable to become disconnected or result in damage to the cables and plugs.

When using the L4943 Connection Cable Set (accessory)

Of the compatible instruments, the strap buckle can only be used with the DT4261 and CM series as other models lack strap holes. Exercise care not to subject the cables or plugs to a mechanical load.

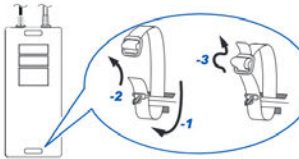
1. Disconnect the clip from the strap buckle as shown in the figure.

Two strap buckles, including a spare one, have come with the device.

2. Attach the strap to the device.

Strap

- 1 Pass the strap through the strap attachment hole on the back of the device.
- 2 Pass the strap through the clip.
- 3 Secure the strap as shown in the figure.



3. Attach the strap buckle to a compatible instrument and connect it to the clip that you attached to the device with the strap.

Example: CM4375-50



When using the L4930 Connection Cable Set or the L4931 Extension Cable Set (optional)

Hang the device in some way, such as using a magnetic strap, not to subject the cables and the plugs to stress.

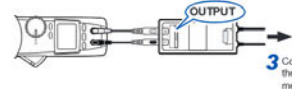
Making measurement

1. Set the compatible instrument to its DC voltage measurement function and select the appropriate range as indicated in the accuracy specifications.

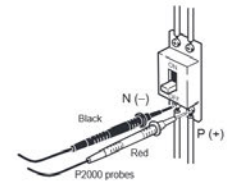
If using an instrument with DC High V Probe mode, enable DC High V Probe mode.

2. Connect the device to the compatible instrument with the connection cable.

Connect the instrument's COM and V terminals to the device's OUTPUT L (black) and OUTPUT H (red) terminals, respectively, with the L4943 (accessory) or L4930 (optional).



3. Connect the device's probe to the object under measurement.



4. Check the measured value.
The actual measured value is obtained by converting the displayed measured value based on the output ratio.
Example: For the CM4375, multiply by 11.
Instruments with DC High V Probe mode display the actual measured value, eliminating the need for conversion.

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