

HIOKI

# P2010

## DC HIGH VOLTAGE PROBE

### Instruction Manual

EN

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# HIOKI

HIOKI E.E. CORPORATION

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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 P2010 DC High Voltage Probe. To ensure you get the most out of this device over the long term, please read this manual carefully and keep it available for future reference. Please review the separate *Operating Precautions* before using this device.



### Target 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).

### Checking package contents

When you receive the product, inspect it for damage or anomaly. If you find any damage or discover that the product does not perform as indicated in the specifications, please contact your authorized Hioki distributor or reseller.

- P2010 DC High Voltage Probe
- Instruction Manual (this manual)
- Please visit Hioki's website to download PDF versions in other languages.
- Operating Precautions (0990A909)

Remove the protective tubes from the probe tips before use.

### Shipping precautions

Store the packaging material after unpacking the product. Use the original packaging when shipping the product.

### Appearance note

Due to the use of renewable materials (vegetable oil) as raw materials, minor appearance defects such as air bubbles may occur. These defects will not affect the device performance.

### Overview

This device is a probe assembly that can safely measure DC voltages of up to 2000 V (CAT III 2000 V). When connected to the input terminals of a measuring instrument, the device reduces the voltage of an object under measurement to input.

### 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, if not avoided, could result in minor or moderate injury or potential risks of damage to the supported product (or to other property).
	Provides important information and content necessary for operating or maintaining the product.
	Indicates a prohibited action.
	Indicates a mandatory action.

#### Symbols on the device

	Indicates the presence of a potential hazard. See the "Usage Notes" and safety notes listed at the beginning of each operating instruction in the instruction manual and the accompanying document entitled <i>Operating Precautions</i> .
	Indicates that the product can be used for direct current (DC).

#### Symbols for various standards

	Indicates that the product complies with standards imposed by EU directives.
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#### Others

	Indicates that additional information is described below.
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### Safety Information

This device has been designed to conform to the international standard, IEC 61010, and thoroughly tested for safety before shipment. However, using the device in a way not described in this manual may negate the provided safety features. Carefully read the following safety notes and the instruction manual of the measuring instrument to which the device is connected before use.

#### DANGER

- Familiarize yourself with the contents of this manual before use.

Otherwise, the device will be misused, resulting in serious bodily injury or damage to the device.

#### WARNING

- If you have not previously used electrical measuring instruments, ensure adequate supervision by a technician with experience in electrical measurement.

Failure to do so could cause the user to experience an electric shock.

It could also cause serious events such as heat generation, fire, or arc flash due to a short-circuit.

- Wear electrically insulating personal protective equipment (PPE) according to laws and regulations.

Making measurements using this device involves live-line work. Failure to wear PPE could cause the user to experience an electric shock.

### Precautions for Use

Observe the following precautions to ensure the safe use of the device and the effective use of its capabilities.

#### DANGER

- Check the cables for the exposed white inner insulation layer.

Using a cable with its inner color layer exposed will cause the user to experience an electric shock.

#### CAUTION

- Do not allow the cords to be caught between other objects or step on them.

Doing so may damage the insulation, causing the user to experience an electric shock

- Do not bend or pull on the cables at temperatures of 0°C or lower.

The cables could harden in low temperatures. Bending or pulling a cable under these conditions could break the cable or damage the insulation, causing the user to experience an electric shock.

- Do not subject the device to vibration or mechanical shock while transporting or handling it.

- Do not drop the device on the floor.

Doing so could damage the device.

- Do not touch the tips of the probes.

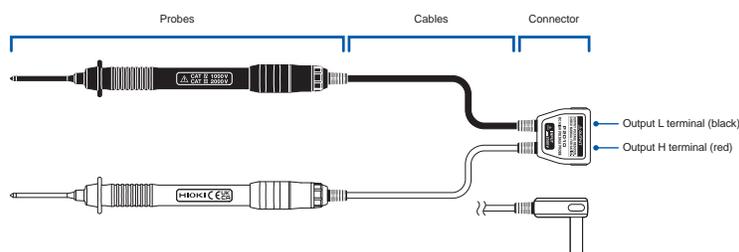
The sharp tips could cause bodily injury.

### Inspecting the Device Before Use

Inspect the device for failure and damage and check it for proper operation before use. If you find any failure or damage, contact your authorized Hioki distributor or reseller.

Check Item	Action
<ul style="list-style-type: none"> <li>• The device does not have any damage or cracks.</li> <li>• The internal circuits are not exposed.</li> <li>• The probes and cables do not have any damaged insulation or exposed white-inner layer or metal.</li> </ul>	If you find any damage, request repair. Using a damaged device could cause the user to experience an electric shock.
No foreign matters, such as metal pieces, adhere to the terminals.	Remove the foreign matter with a cotton swab or a soft cloth.
Connect the probe to a compatible measuring instrument, measure a sample with a known value (for example, a battery or DC voltage generator), and verify that the instrument displays the expected reading.	If the instrument displays an improper reading, the probe may be malfunctioning. Please request repair.

### Part Names



#### Serial number (on the back of the connector)

The serial number consists of nine digits. The first two digits indicate the year of manufacture, while the second two digits indicate the month of manufacture. Do not remove this sticker because the number is important.



## Specifications

### Accuracy labeling

The accuracy of the measuring instrument is expressed using a combination of the formats shown below:

- By defining limit values for errors using the same units as measured values.
- By defining limit values for errors as a percentage of the reading.
- Reading (display value)
- Limit values for reading errors are expressed as a percentage of the reading (% of reading or % rdg).

<b>Operating environment</b>	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
<b>Operating temperature and humidity range</b>	Temperature -25°C to 65°C (-13°F to 149°F) Humidity • At a temperature of -25°C to 40°C (-13.0°F to 104.0°F) 80% RH or less (non-condensing) • At a temperature of 40°C to 65°C (104.0°F to 149.0°F) 100% RH or less (non-condensing) 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)
<b>Storage temperature and humidity range</b>	-30°C to 70°C (-22.0°F to 158.0°F), 90% RH or less (non-condensing)
<b>Standards</b>	Safety: EN 61010

<b>Dimensions</b>	<ul style="list-style-type: none"> <li>Metal part: Approx. 3.7 mm (0.1 in.) in length Approx. 2.6 mm (0.1 in.) in diameter</li> <li>Tip over the protective finger guard: Approx. 55.3 mm (2.2 in.)</li> <li>Probe: Approx. 200.3 mm (7.9 in.)</li> <li>Cable: Approx. 1500 mm (59.1 in.)</li> <li>Connector (excluding terminals): Approx. 36.2W x 33.75H x 12D mm (1.4W x 1.3H x 0.5D in.)</li> </ul>
<b>Weight</b>	Approx. 150 g (5.3 oz.)
<b>Product warranty duration</b>	3 years
<b>Included accessories</b>	<ul style="list-style-type: none"> <li>Instruction manual (this manual)</li> <li>Operating Precautions (0990A909)</li> </ul>
<b>Optional equipment</b>	The optional equipment listed below are available for the device. To purchase optional equipment, please contact your authorized Hioki distributor or reseller. Optional equipment is subject to change with no advance notice. Check Hioki's website for the latest information. <ul style="list-style-type: none"> <li>C0203 Carrying Case</li> </ul>
<b>Maximum input voltage (maximum rated voltage between the input H and L terminals)</b>	2000 V DC
<b>Maximum rated line-to-ground voltage</b>	1000 V (measurement category IV), Anticipated transient overvoltage: 12,000 V 2000 V (measurement category III), Anticipated transient overvoltage: 15,000 V

<b>Input resistance</b>	20 MΩ ±5.0% (between the input H and L terminals, with the output terminals open)								
<b>Output ratio</b>	See "Accuracy table for compatible instruments."								
<b>Overload protection</b>	2200 V DC, 2200 V AC (applied for 1 minute) (between the input H and L terminals) 600 V DC, 600 V AC (applied for 1 minute) (between the output H and L terminals)								
<b>Output terminals</b>	4 mm banana plugs								
<b>Accuracy guarantee conditions</b>	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)								
<b>Accuracy</b>	See "Accuracy table for compatible instruments."								
<b>Temperature coefficient</b>	Multiply the measurement accuracy by a temperature coefficient that depends on the operating temperature range.								
	<table border="1"> <thead> <tr> <th>Operating temperature</th> <th>Temperature coefficient</th> </tr> </thead> <tbody> <tr> <td>-25°C ≤ T &lt; 18°C</td> <td>1 + 0.1 × (T - 18)</td> </tr> <tr> <td>18°C ≤ T ≤ 28°C</td> <td>1</td> </tr> <tr> <td>28°C &lt; T ≤ 65°C</td> <td>1 + 0.1 × (T - 28)</td> </tr> </tbody> </table>	Operating temperature	Temperature coefficient	-25°C ≤ T < 18°C	1 + 0.1 × (T - 18)	18°C ≤ T ≤ 28°C	1	28°C < T ≤ 65°C	1 + 0.1 × (T - 28)
Operating temperature	Temperature coefficient								
-25°C ≤ T < 18°C	1 + 0.1 × (T - 18)								
18°C ≤ T ≤ 28°C	1								
28°C < T ≤ 65°C	1 + 0.1 × (T - 28)								
<b>Accuracy guarantee range</b>	±80 V DC to ±2000 V DC								

## How to Use the Device

### ⚠ DANGER

- Do not cause a short circuit between a wire to be measured and another with the metal probe tip. Doing so will cause an arc flash, resulting in serious bodily injury or damage to the device or other equipment.

### ⚠ WARNING

- Do not measure voltages in excess of 2000 V DC. Do not use the device to measure AC voltages. Doing so could cause damage to the device, resulting in bodily injury.
- Do not allow the cables to contact with the line under measurement. Doing so could damage the device or cause the circuit under measurement to short-circuit, resulting in bodily injury.

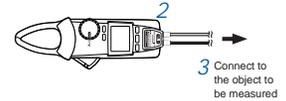
### IMPORTANT

Moisture or dirt on the device's surface, especially on the connector, may cause the instrument to display a value different from the actual voltage. Before measurement, wipe off any moisture and dirt with a soft, dry cloth. If the dirt cannot be removed, use a cloth moistened with a small amount of water or neutral detergent, and then allow the device to dry before making measurements.

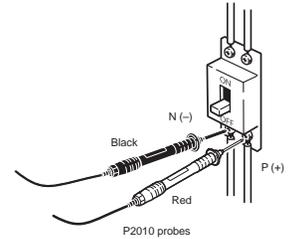
## Making measurements

- Set the compatible instrument to its DC voltage measurement function and select the appropriate range as indicated in the accuracy table. When using an instrument with DC High V Probe mode, enter it in DC High V Probe mode.
- Connect the device to the compatible measuring instrument.

Connect the output L (black) and H (red) terminals of the device to the COM and V terminals of the instrument, respectively.



- Bring the probes of the device into contact with an object to be measured.



- Check the reading. The actual measured value is obtained by converting the reading based on the output ratio. Example: For the CM4375, multiply the reading by 11. Instruments with DC High V Probe mode can display actual measured values; thus, you do not need any conversion.

### Accuracy table for compatible instruments

- Models with DC High V Probe mode

Model	Range <sup>1</sup>	Display range (accuracy guarantee range)	Combinational accuracy	Combinational input impedance
DT4261	600.0 V 2000 V	-600.0 V to 600.0 V (±80.0 V to ±600.0 V) -2000 V to 2000 V (±80 V to ±2000 V)	±0.8% rdg ±0.2 V ±0.8% rdg ±5 V	20 MΩ ±5.0%
CM4141-50, CM4371-50, CM4373-50, CM4375-50	600.0 V 2000 V	-600.0 V to 600.0 V (±80.0 V to ±600.0 V) -2000 V to 2000 V (±80 V to ±2000 V)	±1.0% rdg ±0.3 V ±1.0% rdg ±3 V	19.3 MΩ ±2.0%

<sup>1</sup> Applicable for the following values when the DC high voltage range (DC High V Probe mode) is used: measured value, max., min., and ave.

- DC power

Model	Current range	Voltage range <sup>2</sup> (input voltage range)	Accuracy guarantee range (resolution)	Combinational accuracy
CM4371-50	20.0 A	600.0 V (±80.0 V to ±600.0 V) 2000 V (±80 V to ±2000 V)	0.00 kVA to ±12.00 kVA <sup>3</sup> (0.01 kVA) 0.00 kVA to ±40.00 kVA (0.01 kVA)	±3.0% rdg ±0.20 kVA ±3.0% rdg ±0.20 kVA
CM4371-50, CM4373-50	600.0 A	600.0 V (±80.0 V to ±600.0 V) 2000 V (±80 V to ±2000 V)	0.0 kVA to ±360.0 kVA <sup>3</sup> (0.1 kVA) 0 kVA to ±1200 kVA (1 kVA)	±3.0% rdg ±2.0 kVA ±3.0% rdg ±20 kVA
CM4373-50	2000 A	600.0 V (±80.0 V to ±600.0 V) 2000 V (±80 V to ±2000 V)	0 kVA to ±1200 kVA <sup>3</sup> (1 kVA) 0 kVA to ±4000 kVA (1 kVA)	±3.0% rdg ±20 kVA ±3.0% rdg ±20 kVA
CM4375-50	1000 A	600.0 V (±80.0 V to ±600.0 V) 2000 V (±80 V to ±2000 V)	0 kVA to ±600 kVA <sup>3</sup> (1 kVA) 0 kVA to ±2000 kVA (10 kVA)	±3.0% rdg ±20 kVA ±3.0% rdg ±20 kVA

<sup>2</sup> When the DC high voltage range (DC High V Probe mode) is used

<sup>3</sup> The segment [—kVA] is displayed when the input voltage is below 80.0 V.

- Models without DC High V Probe mode

Model	Function	Range	Output ratio	Combinational accuracy
DT4281, DT4282	DCV	60.000 V 600.00 V	1/10 1/10	±0.8% rdg ±0.002 V ±0.8% rdg ±0.02 V
DT4251, DT4252, DT4253	DCV	60.00 V 600.0 V	1/10 1/10	±1.2% rdg ±0.05 V ±1.2% rdg ±0.5 V
DT4254, DT4255, DT4256	DCV	60.00 V 600.0 V	1/10 1/10	±1.2% rdg ±0.03 V ±1.2% rdg ±0.3 V
CM4371, CM4372, CM4373, CM4374, CM4375, CM4376, CM4141, CM4142	DCV	60.00 V 600.0 V	1/11 1/11	±3.0% rdg ±0.03 V ±3.0% rdg ±0.3 V

## Maintenance and Service

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

### Calibration

The appropriate schedule for calibration depends on factors such as the operating conditions and environment. Determine the appropriate calibration interval based on your operating conditions and environment and have Hioki calibrate the device accordingly.

### Cleaning

#### ⚠ CAUTION

- To clean the device, wipe it with a soft cloth moistened with water or a neutral detergent.
- Using solvent-containing detergents, such as benzene, alcohol, acetone, ether, ketone, thinners, and gasoline, or wiping the device with excessive force could cause deformation or discoloration.

### Shipping precautions

Observe the following when shipping the device.

#### ⚠ CAUTION

- When requesting repair, include 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 damage the product during shipment.