

HIOKI

9322

DIFFERENTIAL PROBE

INSTRUCTION MANUAL

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Introduction

Thank you for purchasing the HIOKI "Model 9322 DIFFERENTIAL PROBE". To obtain maximum performance from the device, please read this manual first, and keep it handy for future reference.

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E. E. CORPORATION
 Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan
 Product Name: DIFFERENTIAL PROBE
 Model Number: 9322

The above mentioned product conforms to the following product specifications:

Safety: EN61010-1:2001
 EN61010-031:2002
 EMC: EN61326-1:1997+A1:1998+A2:2001+A3:2003
 Class A equipment
 Equipment intended for use in industrial locations

Supplementary Information:
 The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E. E. CORPORATION
 15 September 2006
 T. Yoshida
 Tatsuoyoshi Yoshiike
 President
 9322A989-01

Overview

The 9322 is a differential probe that connects to input of 8800 series Memory HiCorder input unit. After high voltage is input to H and L terminal and divided by 1/1000, the difference is output as signal to GND.
For power supply, the optional AC adapter or the power cord is required.

To use 9325 POWER CORD (8940 F/V UNIT), use appropriate units with versions listed below. Contact your dealer or HIOKI representative for details.

Model : 8826 (After Ver.2.30 (Unit No.1999-0338386)),
8841/42 (After Ver.2.31), 8835-01 (After Ver.1.10, 9540-01 Install model after Ver.5.10), 8860/61
(Model 8835: not compatible)

Inspection and Maintenance

Initial Inspection

When you receive the device, 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 dealer or Hioki representative.

Confirming package contents

- 9322 DIFFERENTIAL PROBE
- Alligator clip 2 (Black and red)
- Grabber clip 2 (Black and red)
- Carrying case 1
- Instruction manual 1

Preliminary Checks

- Before using the device the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.
- Before using the device, make sure that the insulation on the probes is undamaged and that no bare conductors are improperly exposed. Using the device in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.

Maintenance and Service

- To clean the device, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- If the device seems to be malfunctioning, contact your dealer or Hioki representative.
- Pack the device so that it will not sustain damage during shipping, and include a description of existing damage. We cannot accept responsibility for damage incurred during shipping.

Safety

This manual contains information and warnings essential for safe operation of the device and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

⚠ DANGER

This device is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the device. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from device defects.

Safety Symbol

	In the manual, the symbol indicates particularly important information that the user should read before using the device. The symbol printed on the device indicates that the user should refer to a corresponding topic in the manual (marked with the symbol) before using the relevant function.
	Indicates that dangerous voltage may be present at this terminal.
	Indicates AC (Alternating Current).
	Indicates DC (Direct Current).
	Indicates both DC (Direct Current) and AC (Alternating Current).
	Indicates a grounding terminal.

The following symbols in this manual indicate the relative importance of cautions and warnings.

	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a possibility of injury to the user or damage to the device.

Measurement categories (Overvoltage categories)

This device complies with CAT II safety requirements. To ensure safe operation of measurement devices, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called measurement categories. These are defined as follows.

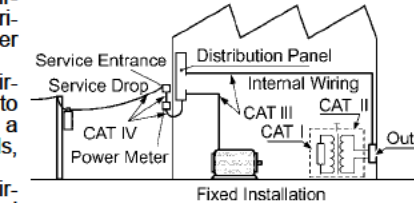
CAT I: Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.

CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)

CAT III: Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.

CAT IV: The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel). Higher-numbered categories correspond to electrical environments with greater momentary energy. So a measurement device designed for CAT III environments can endure greater momentary energy than a device designed for CAT II.

Using a measurement device in an environment designated with a higher-numbered category than that for which the device is rated could result in a severe accident, and must be carefully avoided. Never use a CAT I measuring device in CAT II, III, or IV environments. The measurement categories comply with the Overvoltage Categories of the IEC60664 Standards.



Usage Notes

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

⚠ DANGER

Note the following maximum input voltage and maximum rated voltage to earth. If their voltages are exceeded, this device will be damaged and personal injury will result. Therefore, do not perform measurement in this case.

- Maximum input voltage (CAT II) 2000 V DC, 1000 V AC, (CAT III) 600 V AC/DC
- Maximum rated voltage to earth
When using the Grabber clip: (CAT II) 1500 V AC/DC, (CAT III) 600 V AC/DC
When using the Alligator clip: (CAT II) 1000 V AC/DC, (CAT III) 600 V AC/DC

⚠ WARNING

- Do not allow the device to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- To avoid shock and short circuits, turn off all power before connecting probes
- Do not allow the device to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- To avoid shock and short circuits, turn off all power before connecting probes
- The 9322 input part is applied with high voltage. To avoid electric accident, be sure to turn off the power of equipment to be measured before connecting. After connection is properly handled, turn the power on.

⚠ CAUTION

- Do not store or use the device where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the device may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This device is not designed to be entirely water- or dust-proof. Do not use it in an especially dusty environment, nor where it might be splashed with liquid. This may cause damage.
- To avoid damage to the device, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.

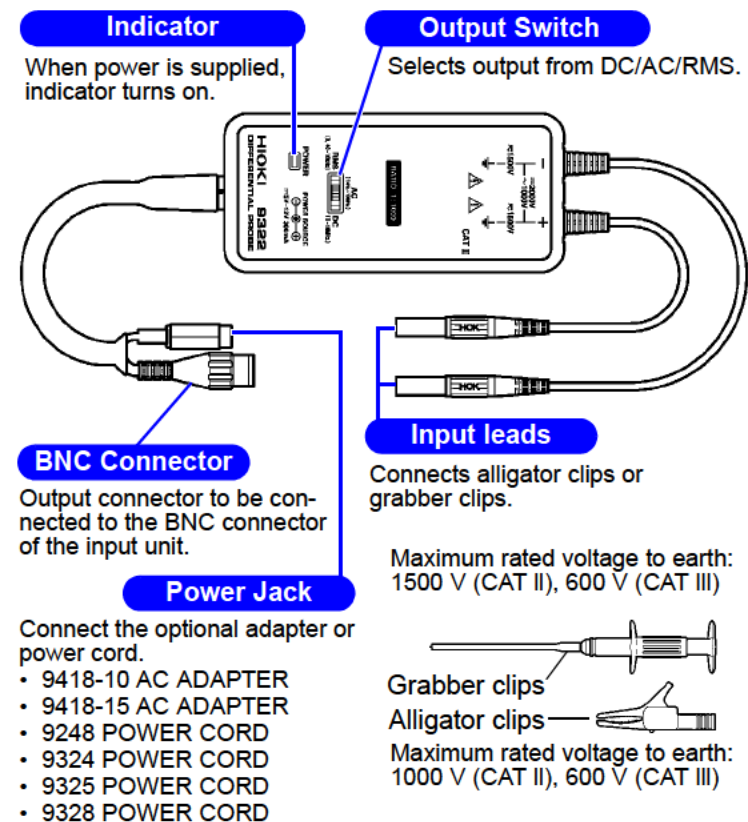
Specifications

Accuracy guaranteed for one year at 23±5°C (73±9°F), 35 to 80%RH, after 30 minutes warming-up time

Maximum input voltage	2000 V DC, 1000 V AC (CAT II) 600 V AC/DC (CAT III)
Maximum rated voltage to earth	Grabber clip: 1500 V AC/DC (CAT II), 600 V AC/DC (CAT III) Alligator clip: 1000 V AC/DC (CAT II), 600 V AC/DC (CAT III)
Attenuation ratio	1000:1
Output	BNC terminal (DC/AC/RMS output)
DC output	
Amplitude accuracy	±1%f.s (1000 V DC max.), ±3%f.s (2000 V DC max.) f.s. = 2000 VDC
Frequency characteristic	DC to 10 MHz (±3 dB)
RMS output	
Accuracy	±1%f.s. (DC, 40 Hz to 1 kHz), ±4%f.s. (1 kHz to 100 kHz) f.s. = 1000 V AC
Frequency characteristic	DC, 40 Hz to 100 kHz
Response speed	200 ms max. (400 V AC)
AC output	
Cut-off frequency	1 kHz±300 Hz
Common mode rejection ratio	10000:1 or more (50/60 Hz, input shorted, Input:output) 1000:1 or more (100 kHz, 1 MHz, input shorted, Input:output)
Temperature characteristic	1 mV/°C max. (output)
Input resistance	9 MΩ±2%, 10 pF max. (between H and L) 4.5 MΩ±2%, 20 pF max. (between H, L and main unit)
Operating temperature & humidity	0 to 40°C (32 to 104°F), 35 to 80% RH (no condensation)
Storage temperature & humidity	-10 to 50°C (14 to 122°F), 20 to 90% RH (no condensation)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Effect of radiated radio-frequency electromagnetic field	Within ±5%f.s. at 3 V/m
Effect of conducted radio-frequency electromagnetic field	Within ±5%f.s. at 3 V
Power supply	+5 V to +12 V 300 mA max. DC jack: φ5.5 x 2.1 mm • Supplied from the 9418-10 AC ADAPTER (PSA-30U-120, PHIHONG) or 9418-15 AC ADAPTER (SA130A-1225V-S, SINO AMERICAN) • Supplied from the 9687 PROBE POWER UNIT with the 9248 POWER CORD. • Supplied from the logic connector of the main unit with the 9324 POWER CORD. • Supplied from the sensor connector of the 8940 F/V UNIT with the 9325 POWER CORD. • Supplied from the power terminal of the 8950 ANALOG UNIT, 8952 RMS/DC UNIT, 8953/ 8953-10 HIGH RESOLUTION UNIT, or 8955 F/V UNIT with the 9328 POWER CORD

Dimensions and mass	Approx. 70W x 150H x 25D mm (2.76"W x 5.91"H x 0.98"D), Approx.350 g (12.3 oz.)
Accessories	<ul style="list-style-type: none"> • Two Alligator clips • Two Grabber clips • Carrying case • Instruction Manual
Options	<ul style="list-style-type: none"> • 9418-10 AC ADAPTER (PSA-30U-120, PHIHONG) • 9418-15 AC ADAPTER (SA130A-1225V-S, SINO AMERICAN) • 9248 POWER CORD (for the 9687) • 9324 POWER CORD (for the logic connector) • 9325 POWER CORD (for the sensor connector of the 8940) • 9328 POWER CORD (for the 8950, 8952, 8953, 8953-10, 8955)
Applicable Standards	
Safety	EN 61010 Pollution degree 2, Measurement category II, (Anticipated Transient Overvoltage: 6000 V)
EMC	EN 61326 Class A

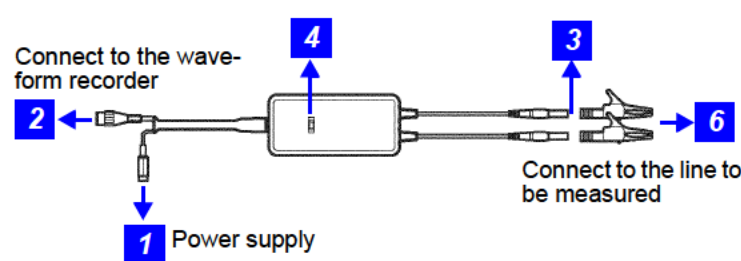
Parts Names



Using Method

CAUTION

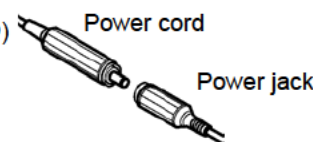
- When disconnecting the BNC connector, be sure to release the lock before pulling off the connector. Forcibly pulling the connector without releasing the lock, or pulling on the cable, can damage the connector.
- To prevent damage to the instrument and device, turn off the power to all devices before plugging or unplugging any cables or peripherals.



1 Connect the optional AC adapter or power cord to the power jack.

Depending on the usage, the AC adapter and power cord to use for the connection may be different.

(example:
9324 POWER CORD)



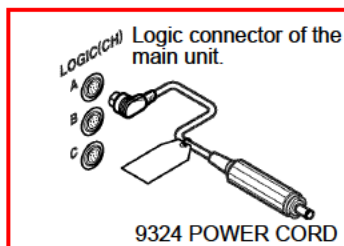
When power is supplied from a commercial power source:

Connect the 9418-10 AC ADAPTER or 9418-15 AC ADAPTER.

(When power is supplied, indicator turns on.)

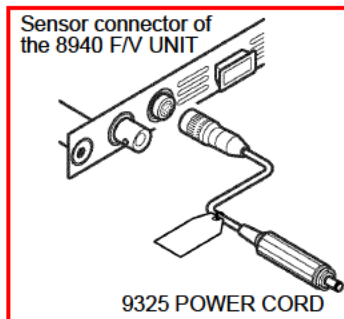
When power is supplied from the logic connector of the Memory HiCorder main unit:

Connect the 9324 POWER CORD



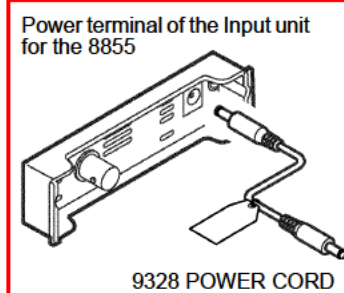
When power is supplied from the 8940 F/V UNIT:

Connect the 9325 POWER CORD



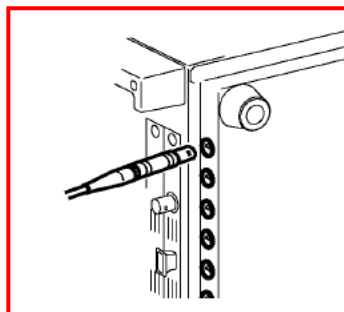
When power is supplied from the input units (8950/ 8952/ 8953/ 8953-10/ 8955) of the 8855 main unit:

Connect the 9328 POWER CORD.



When power is supplied from the input units of the 9687 PROBE POWER UNIT.

Connect the 9248 POWER CORD.



When multiple power cords are used:

When using the 9248 POWER COERDS

9322 only	Total: 8
Including with 3273	Total: 8
Including with 3273-50, 3274 and 3276	Total: 6
Including with 3275	Total: 5

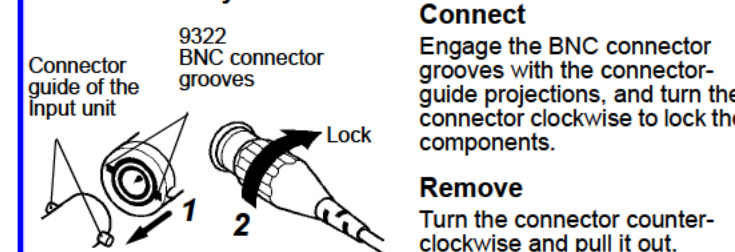
When using the 9324 POWER CORDS

Memory HiCorder	Number of cords that can be used	Using 9322 and 9320/21LOGIC PROBE together
8826	4	9324 : 4 3 2 1 9320/21: 0 4 6 7
8841, 8842, 8835, 8835-01	1	Cannot be used together

When using the 9325 POWER CORDS

Memory HiCorder	Number of cords that can be used	Using 9322 and 9270 series or 3273 clamp sensor together
8826, 8841, 8842	6	8826: total 6, 8841/42: total 4
8835-01	4	Total: 4
8860, 8861	6	Total: 8

2 Connect the BNC connector to the input unit of the Memory HiCorder.



3 Connect the alligator clip or grabber clip to the input leads.

Use either one of them, depending on the object to measure.

4 Select the output using the output switch.

DC	After each H and L terminal signal is divided into voltage by 1/1000, the difference is output as signal to GND.
AC	By converting DC signal to AC, impulse voltage is sampled on carrier voltage.
RMS	Applies RMS conversion on DC output signal and outputs as level change.

5 Set up input range scaling.

(Use the Memory HiCorder main unit to set up.)
See "About input range scaling" for details.

6 Connect to the object and then perform measurement.

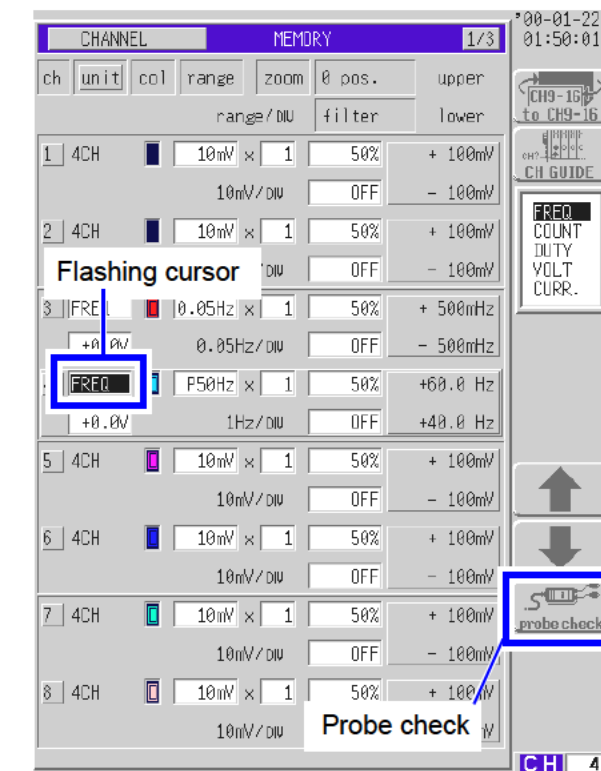
About input range scaling

Before performing measurement, use the Memory HiCorder to set up the input range scaling.

Depending on the Memory HiCorder where the 8940 F/V UNIT can be installed, input range scaling can be set up automatically. For other input units, set up scaling manually. For details, refer to the instruction manual that comes with each Memory HiCorder.

Example 1

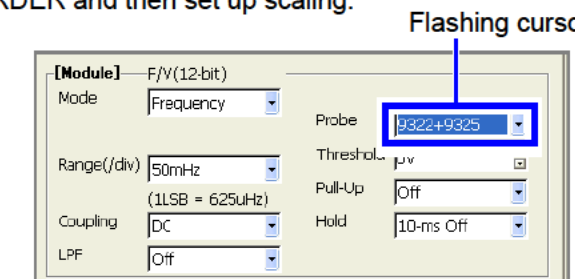
To install the 8940 F/V UNIT in the 8841 MEMORY HiCORDER and then set up scaling:



1. Display desired channel screen to set.
2. Move the flashing cursor to the position shown in the figure above.
3. Select "Probe check" from function key display. Voltage axis scaling is magnified by 1000 times. Threshold is multiplied by 100 at frequency, duty rate, count mode.

Example 2

To install the 8940 F/V UNIT in the 8860 MEMORY HiCORDER and then set up scaling:



1. Display desired channel screen to set.
2. Move the flashing cursor to the position shown in the figure above.
3. Using the 9325:
Select "9322+9325" from function key display.
Using the 9418-15:
Select "9322+9418" from function key display. Voltage axis scaling is magnified by 1000 times. Threshold is multiplied by 100 at frequency, duty rate, count mode.