HIOKI

SP3000-01 Instruction Manual

SP3000
NON-CONTACT AC VOLTAGE PROBE

SP9001
AC VOLTAGE PROBE

EN

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- Regional contact information
- The latest revisions of instruction manuals and manuals in other languages.
- Declarations of Conformity for instruments that comply with CE mark requirements.

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 one (1) year 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 purchasing the Hioki SP3000-01, SP3000 Non-Contact AC Voltage Probe and SP9001 AC Voltage Probe. To obtain maximum performance from the device, please read this manual first, and keep it handy for future reference.

Verifying Package Contents
When you receive the device, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your authorized Hioki distributor or reseller.

Inspection Before Use
Verify that the device operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your authorized Hioki distributor or reseller.

Precautions when transporting the device
During shipment of the device, handle it carefully so that it is not damaged due to a vibration or shock.

Calibrations
The calibration period varies depending on the status of the device or installation environment. We recommend that the calibration period be determined in accordance with the status of the device or installation environment. Please contact your Hioki distributor to have your device periodically calibrated.

Overview
The SP3000 Non-Contact AC Voltage Probe and the SP9001 AC Voltage Probe are voltage probes that can make measurements in a non-contact manner from outside cable insulation.
The SP3000 and SP9001 cannot be used alone. Instead, the two units must be used together.
The model (order code) SP3001-01 Non-Contact AC Voltage Probe indicates a package that includes both the SP3000 and the SP9001.

Safety Information
This device is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, using the device in a way not described in this manual may negate the provided safety features. Before using the device, be certain to carefully read the following safety notes:

⚠DANGER

Mishandling during use could damage to the device. Be certain that you understand the instructions and precautions in the manual before use.

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

⚠DANGER	Indicates an imminently hazardous situation that will result in death or serious injury to the operator.
⚠WARNING	Indicates a potentially hazardous situation that may result in death 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 device or malfunction.
Indicates prohibited actions.	Indicates the action which must be performed.

Symbols on the device

	Indicates cautions and hazards. When the symbol is printed on the device, refer to a corresponding topic in the Instruction Manual.		
⎓	Indicates DC (Direct Current)	~	Indicates AC (Alternating Current)

Symbols for various standards

	Indicates the Waste Electrical and Electronic Equipment Directive (WEEE Directive) in EU member states.
CE	Indicates that the product conforms to regulations set out by the EC Directive.

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Operating Precautions

⚠WARNING

- **Installing the device in inappropriate locations may cause a malfunction of device or may give rise to an accident. Avoid the following locations:**
  - **Exposed to direct sunlight or high temperature**
  - **Exposed to corrosive or combustible gases**
  - **Exposed to a strong electromagnetic field or electrostatic charge**
  - **Susceptible to vibration**
  - **Exposed to water, oil, chemicals, or solvents**
  - **Exposed to high humidity or condensation**
  - **Exposed to high quantities of dust particles**
- **To avoid injury or damage to the device, do not attempt to measure AC voltage, or DC voltage exceeding 30 V.**

- **Use only the Model Z1013 AC Adapter. AC adapter input voltage range is 100 V to 240 V AC at 50 Hz/60 Hz. To avoid electrical hazards and damage to the device, do not apply voltage outside of this range.**
- **To avoid electrical accidents and to maintain the safety specifications of this device, connect the power cord provided only to an outlet.**

⚠CAUTION

- Do not place foreign objects between the hookclip or insert foreign objects into the gaps of the sensor head. Doing so may worsen the performances of the sensor or interfere with clamping action. Exercise caution due to the potential for injury if a finger is pinched by the hookclip.
- Be careful to avoid dropping the device or otherwise subjecting them to mechanical shock, which could damage the hookclip and adversely affect measurement.
- If you connect to metal BNC connector, the output terminal (BNC connector) of the device may be damaged.
- Do not use the probe in temperatures that exceed the temperature at which the insulation on the cable being measured softens. Doing so may result in cable damage if the probe is connected to cable above that temperature.

- Before turning the device on, make sure the supply voltage matches that indicated on its power connector. Connection to an improper supply voltage may damage the device and present an electrical hazard.
- Do not connect the supply voltage improperly. Doing so may damage the device's internal circuitry.
- This device is not drip-proof. Water droplets on the device may result in malfunctions.
- To avoid damage to the device, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.
- The cable of the device is hardened under the 0°C or colder environment. Do not bend or pull it to avoid tearing its shield or cutting cable.

⚠CAUTION

- To prevent damage to the BNC connector or junction, be sure to unlock the connector and then pull it out while gripping the BNC connector itself (rather than the cable).

- Displayed values can frequently fluctuate due to induction potential even when no voltage is applied. This, however, is not a malfunction.
- Unplugging the USB cable kills power to the device. Be sure to provide enough unobstructed space to unplug the USB cable immediately in an emergency.

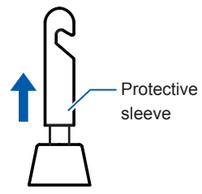
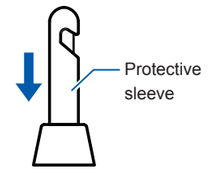
Maintenance and Service

⚠WARNING

Customers are not allowed to modify, disassemble, or repair the device. Doing so may cause fire, electric shock, or injury.

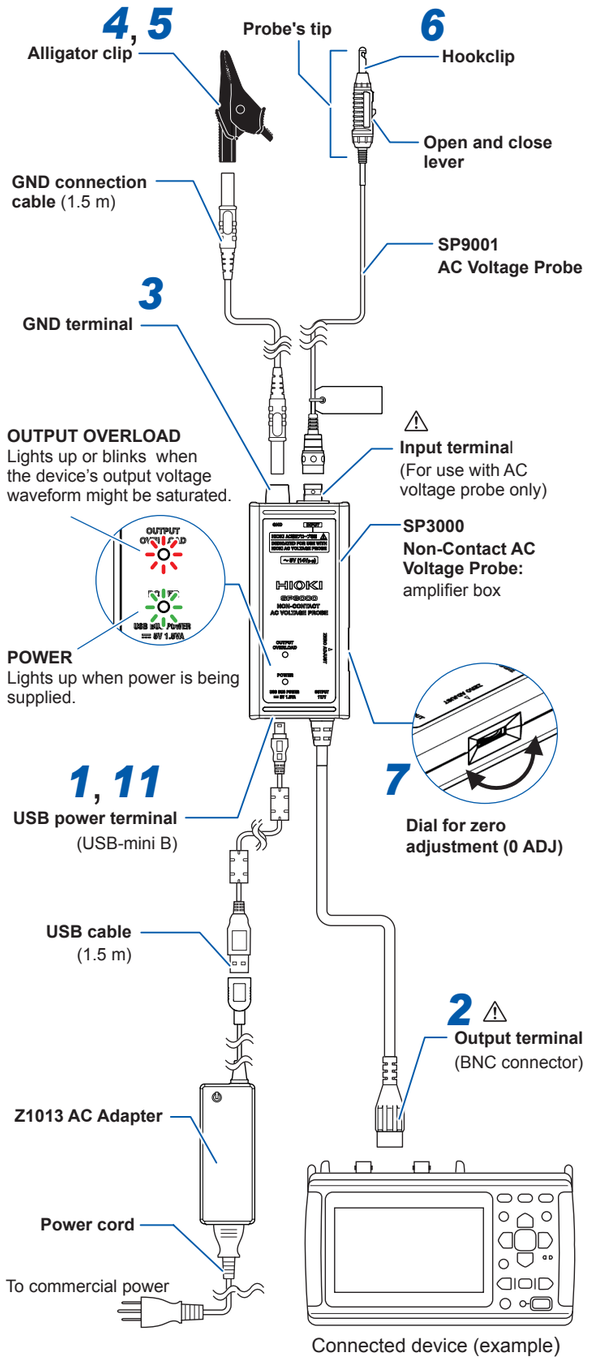
- To prevent damage to terminals from repeatedly connecting and disconnecting them, leave the USB cable, AC voltage probe, and GND connection cable connected when storing the device in a container such as its carrying case.
- To clean the device, wipe it gently with a soft cloth moistened with water or mild detergent.
- Use a soft, dry cloth to lightly wipe away any dirt or other material on the metal portion of the hookclip as it may affect measurement.
- If the device seems to be malfunctioning, confirm that the AC adapter, the UCB cable, the AC voltage probe and the GND connection cable are connected properly before contacting your authorized Hioki distributor or reseller.

Replacing the protective sleeve of hookclip
Protective sleeve of the SP9001 AC Voltage Probe can be replaced. Replacement sleeves can be purchased via authorized Hioki distributor or reseller.

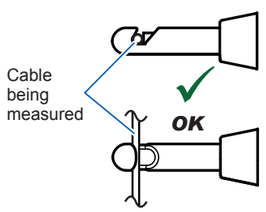
Remove	Attach
 Grip the protective sleeve at its base and pull up to remove.	 Push the protective sleeve down securely all the way to attach.

Exercise care not to tear the protective sleeve on the opening of the hookclip when attaching it.

Parts Names, Connection Example



How to properly connect the probe to the cable being measured



- If the cable being measured is dirty, wipe away the dirt before connecting the probe.
- Insert the cable all the way into the tip of the probe.
- Proper measurement is not possible if the cable is inserted partway or at an angle.

Measurement Procedure

⚠ CAUTION

- Do not connect the device's output terminal (BNC connector) to an instrument with an input resistance of 10 kΩ or less. Doing so may damage the device. The device's signal output circuit includes an output resistor. When monitoring the device's output signal with a digital multimeter or similar instrument, use an instrument with a high input resistance (recommended input resistance: 1 MΩ or greater).

- GND terminal of the SP3000, USB power terminal GND pin, and output terminal (BNC connector) GND pin are not insulated (i.e., they share a common ground). In the event there were a potential difference between any of these ground signals, a current could flow through the ground circuit of the SP3000, damaging the measurement object and device.
- Although the measurement waveform's zero point may exhibit wobble at low frequencies, this is a normal characteristic of the device and does not indicate a problem. When using a Memory HiCorder, oscilloscope, or other waveform measuring instrument, this wobbling characteristic can be improved by selecting the instrument's AC coupling setting. (The AC coupling characteristics will affect the waveform, so be sure that you have a thorough understanding of AC coupling before using this feature.)
- Do not connect the probe to a bare conductor with exposed metal or a measurement cable with damaged insulation. Doing so may damage the device as well as the connected instrument.
- Be sure to wipe the cable to remove any dirt before connecting the probe and ensure that no dirt gets onto the probe. In particular, any dirt that gets onto the hookclip may adversely affect the sensor characteristics or damage the device.
- The probe is affected by nearby conductors (cables). Exercise care as this effect becomes more pronounced the closer a conductor is to the opening in the hookclip.

1 Supply power to the device.
This can be accomplished by either of the following two methods:
- Use the Z1013 AC Adapter to supply power from commercial power.
- Connect the device to a USB receptacle that has USB bus power functionality.

2 Connect the output terminal (BNC connector) to the input terminal on the instrument to which you wish to connect the device.

3 Connect the GND connection cable to the GND terminal.

4 Connect the alligator clip to the GND connection cable.

5 Connect the alligator clip to the measurement object's GND contact.

6 Connect the voltage probe (the SP9001) to one (and only one) cable.

7 Execute zero adjustment.
Rotate the zero adjustment dial (labeled "0 ADJ") on the right side of the device to set the zero point for the waveform.

8 Start the measurement.

9 After measurement is complete, disconnect the alligator clip and voltage probe from the measurement object. (See the lower left figure.)

10 Disconnect the device from the instrument.

11 Disconnect the USB cable that is supplying power to the device from the AC adapter or the host device's USB receptacle.

Specifications

f.s. : The rated measurement voltage.
rdg.: The value currently being measured and indicated on the measuring instrument.

SP3000 Non-Contact AC Voltage Probe

General Specifications

Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity	Temperature: −10°C to 50°C (14°F to 122°F) Humidity: −10°C to 40°C (14°F to 104°F), 80% RH or less (no condensation) 40°C to 50°C (104°F to 122°F), 60% RH or less (no condensation)
Storage temperature and humidity	−20°C to 60°C (−4°F to 140°F), 80% RH or less (no condensation)
Standards	Safety: EN 61010 EMC: EN 61326
Power supply	USB bus power USB-mini B terminal 5 V ±0.25 V DC Z1013 AC Adapter: (5 V DC, 2.6 A) Rated supply voltage: 100 V to 240 V AC Rated supply frequency: 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V
Maximum rated power	When using USB bus power: 1.5 VA When using Z1013 AC Adapter: 7.5 VA (including AC Adapter)
Dimensions	Approx. 120W × 25H × 55D mm (4.72″W × 0.98″H × 2.17″D) (excluding protrusions)
Mass	Approx. 160 g (5.6 oz.) (including the cable)
Cable length	Approx. 1.5 m
Product warranty period	1 year
Accessories	GND connection cable (1.5 m), Alligator clip, USB cable (1.5 m), Instruction manual
Options	SP9001 AC Voltage Probe Z1013 AC Adapter C1011 Carrying Case 9804-02 Magnet Adapter

Input / Output / Measurement Specifications

Basic specifications

Probe signal input terminal	BNC terminal
GND input terminal	Banana input terminal
Output terminal	Insulated BNC terminal
Rated measured voltage	5 V rms (14.14 V p-p)
Maximum imput voltage	RMS: 30 V rms or less Peak value: 42.4 V peak or less
Output rate	1 V/V
Rising time (10% to 90%)	4.5 µs or less
Frequency range	10 Hz to 100 kHz (−3 dB band)
Measurement method	Coupling capacitance cancelation method (cannot be used with bare conductors)
OUTPUT OVERLOAD detection	Detected when the peak value including offset exceeds the next voltage value ±7 V±0.5 V
Output resistance	50 Ω±5%

Accuracy specifications

Conditions of guaranteed accuracy	Guaranteed accuracy period: 1 year Guaranteed accuracy period from adjustment made by Hioki: 1 year Temperature and humidity for guaranteed accuracy: 23°C±5°C (73°F±9°F), 80% RH or less Using SP9001 and Z1013 in combination Using wire with PVC insulation, a standard finished outer diameter of ϕ1.75 mm ±0.15 mm, and a standard insulator thickness of 0.40 mm ±0.05 mm After zero adjustment, not including various effects 50 Hz/60Hz sinusoidal input With a measuring instrument with an input resistance of at least 1 MΩ
Voltage measurement accuracy	±2.5% rdg.±1 % f.s. (0.5 V rms to 5 V rms)
Effect of measured wire	±5% rdg. (using UL1007-/UL1015-/AV-/AVS-/AVSS-compliant wire with a finished outer diameter of ϕ1.0 to 2.5 mm)
Temperature coefficient	In the operating temperature range, add 0.1% rdg./°C (at temperatures other than 23°C±5°C)
Output noise	100 mV rms (as a referential)
Effect of radiated radio-frequency electromagnetic field	±5% f.s. at 10 V/m
Effect of conducted radio-frequency electromagnetic field	±5% f.s. at 10 V

SP9001 AC Voltage Probe

General Specifications

Operating environment	Indoor use, pollution degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity	Temperature: −10°C to 50°C (14°F to 122°F) (Probe's tip: −10°C to 80°C (14°F to 176°F) Humidity: −10°C to 40°C (14°F to 104°F), 80% RH or less (no condensation) 40°C to 80°C (104°F to 176°F), 60% RH or less (no condensation)
Storage temperature and humidity	−20°C to 60°C (−4°F to 140°F), 80% RH or less (no condensation)
Standards	Safety: EN 61010
Dimensions	Approx. 15.0W × 13.9H × 77.4D mm (0.59″W × 0.55″H × 3.05″D) (excluding protrusions)
Mass	Approx. 52g (1.8 oz.) (including the cable)
Cable length	Approx.1.0 m
Product warranty period	1 year
Accessory	Instruction manual

Input / Output / Measurement Specifications

Basic specifications

Output terminal	BNC terminal with protective sleeve
Maximum imput voltage	RMS: 30 V rms or less Peak value: 42.4 V peak or less
Measurable wire	Insulated wire
Measurable wire outer diameter	ϕ1.0 mm to ϕ2.5 mm
Measurement method	Coupling capacitance cancelation method (cannot be used with bare conductors)
Opening and closing of the probe	10,000 times