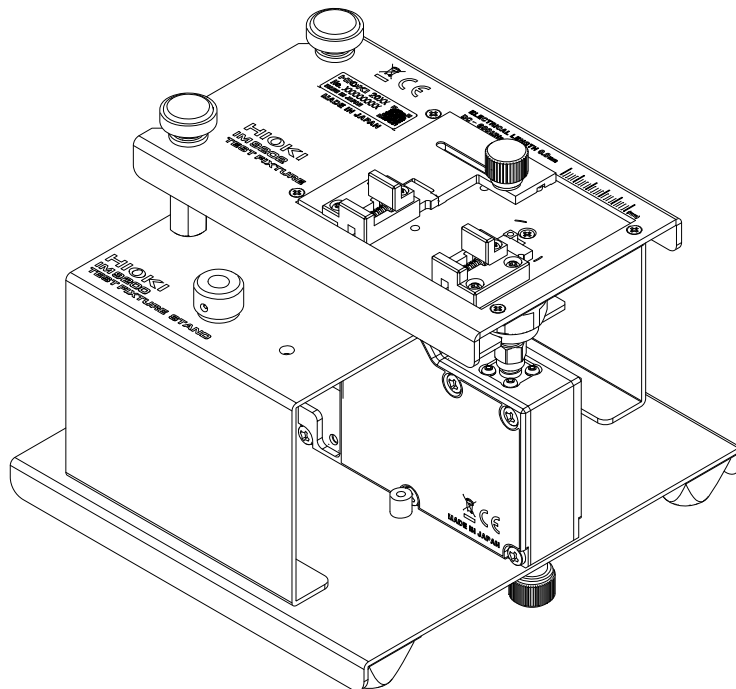


IM9202

Instruction Manual

TEST FIXTURE



Be sure to read this manual before using the instrument.

▶ p.3



When using the instrument for the first time

Part Names and Functions ▶ p.6

Making Measurements ▶ p.8



Troubleshooting

Maintenance and Service ▶ p.25

EN



Introduction

Thank you for choosing the Hioki IM9202 Test Fixture. To ensure your ability to get the most out of the device over the long term, please read this manual carefully and keep it available for future reference.

The device is used by connecting to the impedance analyzer. Before using the impedance analyzer, read the instruction manual of the impedance analyzer carefully.

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).

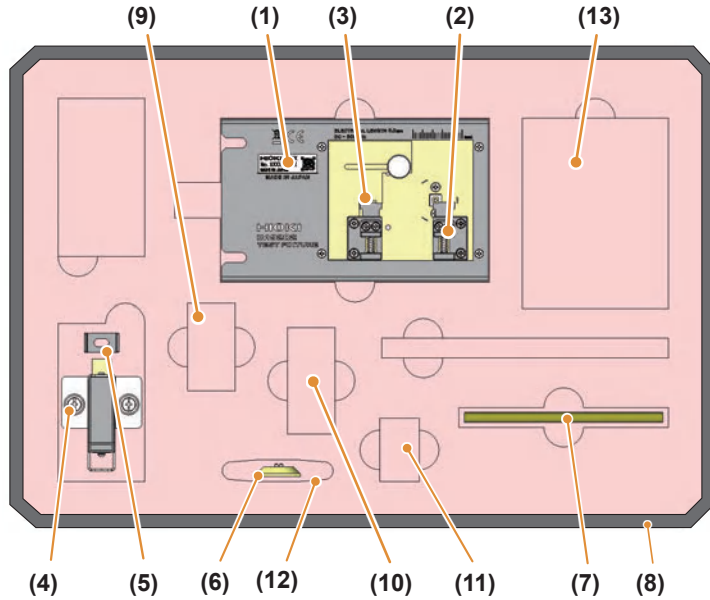
Contents

Checking Package Contents	p.2
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Checking Package Contents

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

Confirm that the following items are provided.



- IM9202 Test Fixture(1)
- H-side lead component clip*(2)
- L-side lead component electrode (with clip)*(3)
- L-side SMD electrode(4)
- SMD open correction jig(5)
- Short plate(6)
- Brush for cleaning.....(7)
- Carrying case(8)
- Instruction manual

* The H-side lead component clip and the L-side lead component electrode are installed on the device.

Options (sold separately)

The options listed below are available for the device. 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.

- IM9906 Adapter (3.5 mm/7 mm).....(9)
- IM9905 Calibration Kit (LOAD)(10)
- IM9905 Calibration Kit (OPEN).....(11)
- IM9905 Calibration Kit (SHORT)*(12)
- Magnifying glass (IM9200 Test Fixture Stand accessory)(13)
- IM9200 Test Fixture Stand

Options (sold separately) can be stored inside (9) to (13) of the carrying case. Please store them after removing the packed sponge at the time of unpacking.

* The IM9905 Calibration Kit (SHORT) can be stowed side by side with the short plate (6).

Safety Information

Carefully read the following safety notes before using the device





CAUTION





- Mishandling during use could damage to the device. Familiarize yourself with the instructions and precautions in this manual before use the device.
- 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.

 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 device or malfunction.
IMPORTANT	Indicates information or content that is particularly important from the standpoint of operating or maintaining the device.
	Indicates an action that must not be performed.
	Indicates an action that must be performed.

Notations related to standards compliance

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

Other notations

*	Instructs the reader to see below for additional information.
(p.)	Indicates the page number to reference.

Operating Precautions

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

Use of the device should conform not only to its specifications, but also to the specifications of all accessories, options and other equipment in use.

Installation Environment

WARNING

Installing the device in inappropriate locations could cause a malfunction of the device, an accident. Avoid locations that are:



- Exposed to direct sunlight or high temperatures
- Exposed to corrosive or combustible gases
- Exposed to strong electromagnetic fields or electrostatic charges
- Near induction heating systems (such as high-frequency induction heating systems and IH cooking equipment)
- Susceptible to vibration
- Exposed to water, oil, chemicals, or solvents
- Exposed to high humidity or condensation
- Exposed to high concentrations of dust particles

CAUTION



Do not place the device on an unstable or uneven surface. Doing so could cause the device to fall or turn over, causing bodily injury or damage to the device.

Handling the Device

CAUTION



- The DUT could pop off the device and into the air while being connected. To prevent injury, use gradual movements when handling clips and electrodes.
- To avoid damage to the device, avoid subjecting it to vibration or mechanical shock during transportation and handling. Exercise particular care to avoid subjecting the device to mechanical shock, for example by dropping.
- To prevent device damage or an electric shock, use only the screws that are originally installed for securing clips or the short plate in place. If you have lost any screws or find that any screws are damaged, please contact your authorized Hioki distributor or reseller.

Measurements

CAUTION



- To avoid bodily injury or damage to the device, do not attempt to measure voltage exceeding 42V.
- To avoid damage to the device, do not connect the charged capacitor to the device.
- Do not apply a voltage across the device's measurement terminals while it is connected to an impedance analyzer. It may cause damage to the impedance analyzer.

IMPORTANT

The accuracy of measured values obtained using the device is not guaranteed. Measured values should be treated as reference values.

Shipping Precautions

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

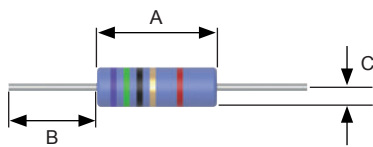
Overview

The device is the test fixture to be used by connecting to the impedance analyzer of Hioki. It performs two-terminal measurement of lead components and SMDs.

Measurable DUT size

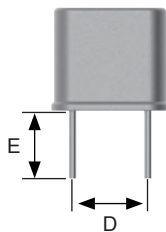
Lead components

Axial



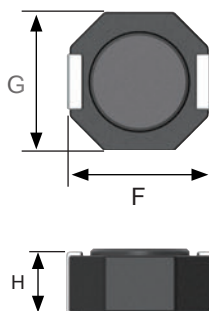
A	Lead interval (Component body length)	1 mm to 25 mm
B	Lead length	2 mm to 10 mm
C	Height to lead*1	2.5 mm or shorter
	Lead wire diameter	0.5 mm to 2 mm

Radial



D	Lead interval	2 mm to 26 mm
E	Lead length*1	2 mm or longer
	Lead wire diameter	0.5 mm to 2 mm

SMD*2



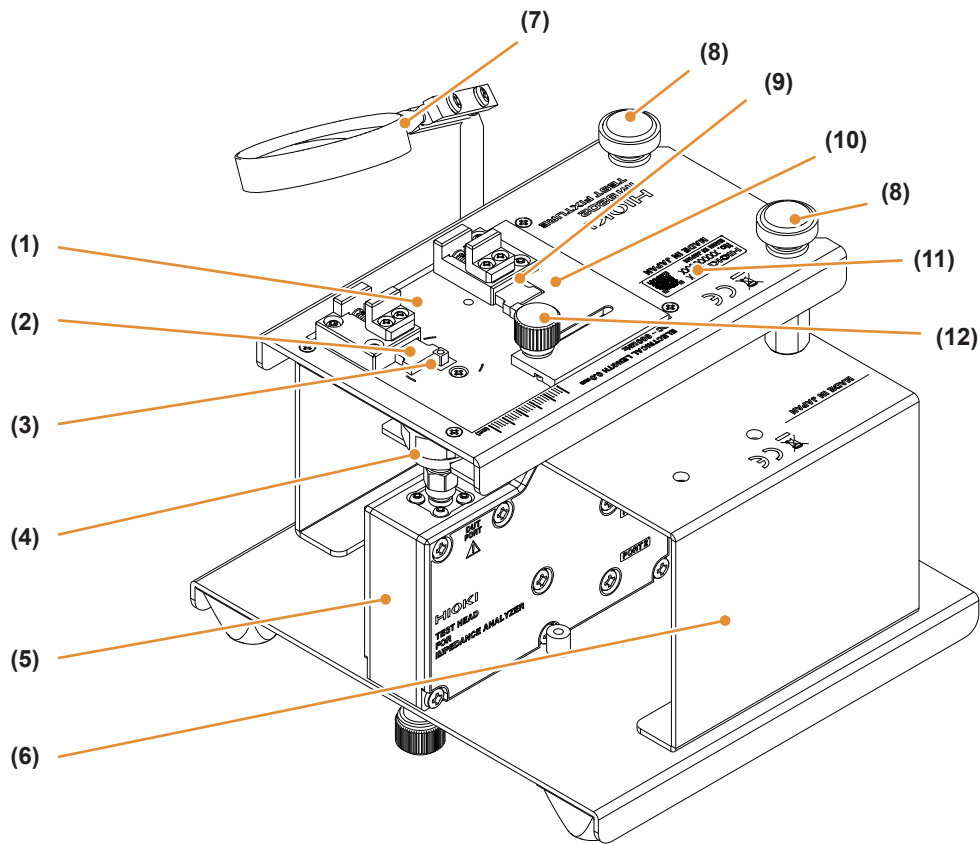
F	Component length	1.6 mm to 23 mm
G	Component width	0.8 mm or longer
H	Component height	0.65 mm or longer

Supported SMD size: EIA0603 (JIS1608) or larger

*1: The component's H-side lead must not make contact with the fixture's L-side electrode.

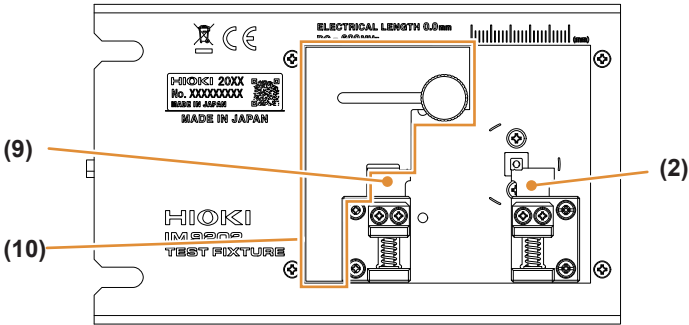
*2: The electrode on the bottom surface of the H side of the component must not make contact with the fixture's L-side electrode.

Part Names and Functions

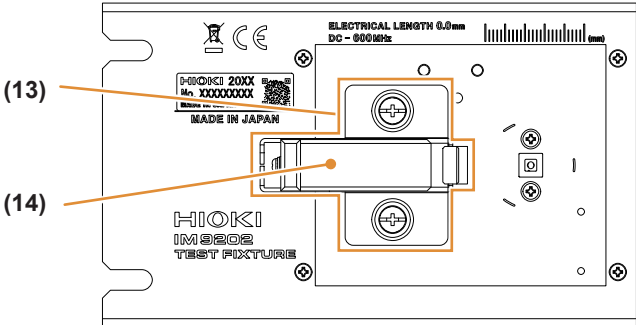


(1)	Base plate	The base plate is at the same potential as the L-side electrodes.
(2)	H-side lead component clip	Connect lead components to the H-side electrode by inserting the lead wire here.
(3)	H-side electrode	Serves as the device's measurement unit.
(4)	IM9906 Adapter (3.5 mm/7 mm)	This specially designed adapter is used to connect the device to the impedance analyzer's test head.
(5)	Test head	The test head comes with the impedance analyzer.
(6)	IM9200 Test Fixture Stand (option)	The exclusive stand for fixing the test head of the impedance analyzer and the device.
(7)	Loupe	The magnifying glass provided with the IM9200 Test Fixture Stand (option). It is used by installing to the IM9200.
(8)	Stand fixing knob	The knob fixes the device to the IM9200 Test Fixture Stand.
(9)	L-side lead component clip	Connect lead components to the L-side electrode by inserting the lead wire here.
(10)	L-side lead component electrode	Serves as the device's measurement unit.
(11)	Serial number	The 9-digit serial number indicates the year (first two digits) and the month of manufacture (next two digits). Do not remove this sticker as the number is important.
(12)	Knob	This knob is used to lock the L-side lead component electrode in place.

The electrode and the clips for measurement of lead components

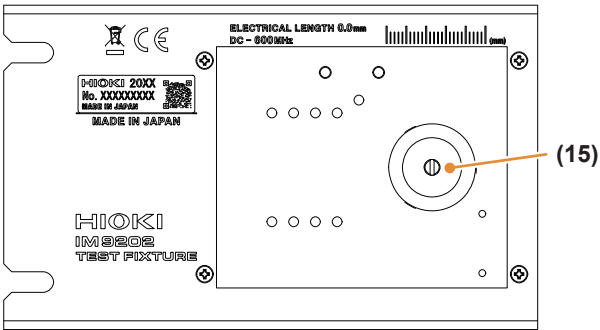


The electrode for measurement of SMDs



(13)	L-side SMD electrode	Used when measuring SMDs.
(14)	Lever	This lever causes the L-side SMD electrode to slide back and forth.

Short plate



(15)	Short plate	Used when performing short correction.
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Making Measurements

Measurement Procedure

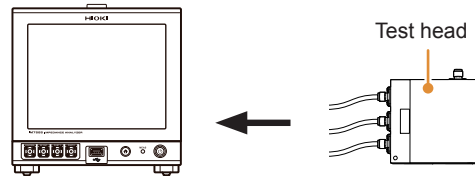
You will need (besides the device and accessories):

- IM7580 series Impedance Analyzer ×1
- IM9200 Test Fixture Stand ×1
- IM9905 Calibration Kit ×1
- IM9906 Adapter ×1
- 3.5 mm connector torque wrench ×1 (not included with the device)
- Tweezers ×1 (This is not included with the device. Tweezers which are thinner than the DUT size, clean, and not magnetized are recommended.)

1 Connect the test head to the impedance analyzer.

Connect the cable of the test head to the impedance analyzer.

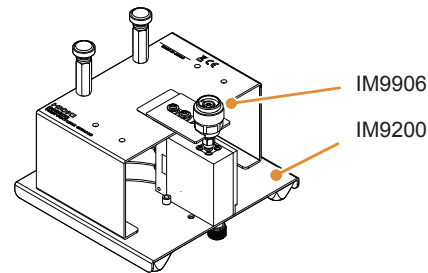
See the instruction manual of the impedance analyzer.



2 Attach the test head and adapter to the stand.

Attach the test head and the IM9906 Adapter to the IM9200 Test Fixture Stand.

(p.10)



3 Execute the calibration.

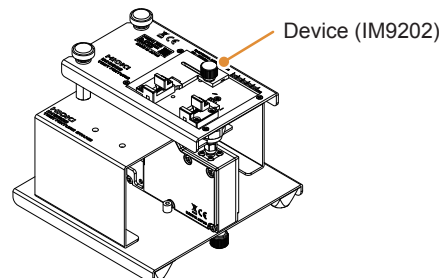
Execute the open calibration, short calibration, and load calibration.

(p.11)

4 Attach the device.

Attach the device to the IM9200 Test Fixture Stand.

(p.14)



5 Execute the correction.

Execute the electrical length correction, short correction, and open correction.

(From p.15)

6 Start the measurement.

Connect the DUT to the measurement location and start the measurement by using the impedance analyzer.

(p.22)

Inspecting the Device Before Use

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

It is recommend to inspect the device prior to use as described below.

Measure residual parameters with an impedance analyzer and verify that the measured values fall within the allowable range.

See "Residual parameters (reference value)" (p.24)

Check items	Remedy
Are the electrode or the short plate worn?	If any of the following applies, send the device for repair: <ul style="list-style-type: none"> • Residual parameters' measured values diverge from the allowable values. • An electrode or the short plate exhibits wear.
Does either of the clips exhibit any damage or unusual appearance?	If any of the following applies, send the device for repair: <ul style="list-style-type: none"> • Either of the clips is cracked or worn. • Either of the clips will not move. • The clips are not able to accommodate a component.
Is the device damaged?	Send the device for repair if it exhibits any deformation in shape or other damage.

Attaching the Test Head and the Adapter

Attach the test head and the IM9906 Adapter to the IM9200 Test Fixture Stand.

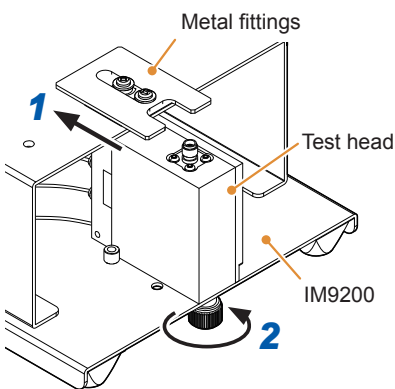
IMPORTANT

The impedance analyzer, test head, and measurement cable are adjusted together at the time of shipment. Use the test head and measurement cable included along with the impedance analyzer. Confirm that the serial number* of the impedance analyzer and test head is same.

* The 9-digit serial number indicates the year (first two digits) and the month of manufacture (next two digits). Do not remove this sticker as the number is important.

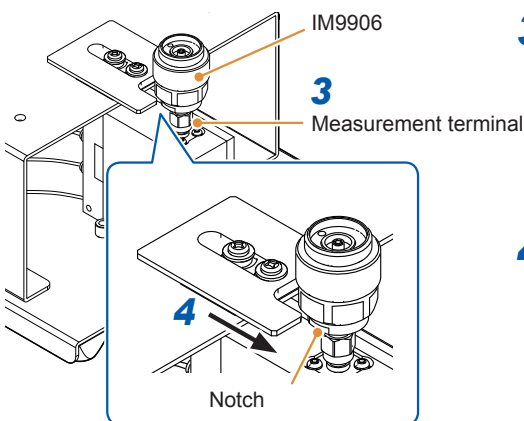
You will need:

- Test head ×1
- IM9200 Test Fixture Stand ×1
- IM9906 Adapter ×1
- 3.5 mm connector torque wrench ×1 (not included with the device)



1 Pull the metal fittings to the IM9200 Test Fixture Stand side.

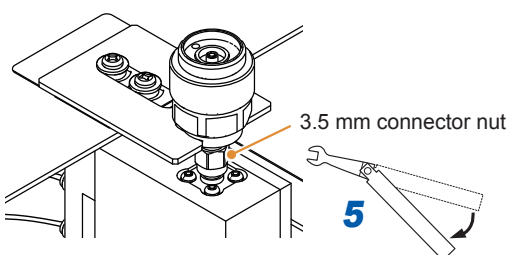
2 Place the test head on the stand and tighten the knob.



3 Place the notch of the IM9906 Adapter parallel to the metal fittings, then install onto the measurement terminal of the test head.

At this time it is stopped temporarily. Position the notch of the IM9906 Adapter where the metal fittings can slide.

4 Fix the notch of the IM9906 Adapter by sliding the metal fittings.



5 Tighten the nut of the 3.5 mm connector by using a torque wrench.

Recommended torque: 0.9 N·m

Tightening the nut until the handle of the wrench bends slightly is sufficient. Do not over tighten.

Calibration

Connect the three standard units, open, short, and load of the IM9905 Calibration Kit to the reference surface (terminal) of the IM9906 Adapter one by one, and measure the respective calibration data. This reference surface is referred to as the “calibration reference surface”. The cause of errors between the impedance analyzer itself and the calibration reference surface is eliminated.

The defined value differs according to the calibration kit to be used. For more information about how to input defined values to the impedance analyzer, see the instruction manual of the impedance analyzer and the Defined Value Setting Application Installation Procedure on the CD-R that came with the IM9905.

CAUTION



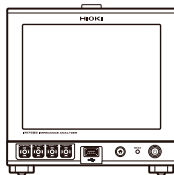
While attaching and detaching the calibration kit, make sure that the internal conductor of the calibration kit does not rotate. If the internal conductor rotates, it may cause damage to the electrode.

When the calibration cannot be executed:

- Confirm that the calibration kit and the IM9906 Adapter are connected properly.
- Check that the DC measurement limit value of the impedance analyzer is appropriate.
- Connect the IM9906 adapter, calibration kit and the device with a 7 mm connector.
Recommended torque for the 7 mm connector is 1.35 N·m.

You will need:

IM9905 Calibration Kit (OPEN, SHORT, and LOAD) ×1 of each



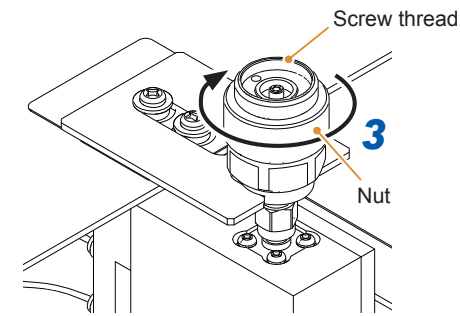
1 Set the measurement conditions like frequency, measurement signal level, and measurement speed in the impedance analyzer.

2 Set the defined values of the calibration kit and offset delay in the impedance analyzer.

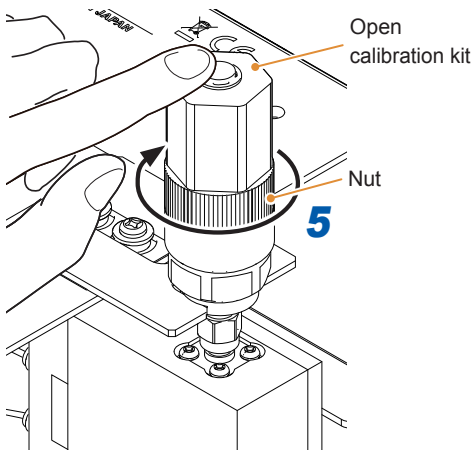
The initial values of the impedance analyzer are set to the values of the following table.

	Defined values	Offset delay
OPEN	G: 0 S, Cp: 82 fF	0 s
SHORT	Rs: 0 Ω, Ls: 0 H	0 s
LOAD	Rs: 50 Ω, Ls: 0 H	0 s

To use the IM9905's LOAD defined value, use the Defined Value Setting Application that came with the IM9905 to configure the impedance analyzer with the defined value.



3 Raise the screw thread by turning the nut on the IM9906 Adapter

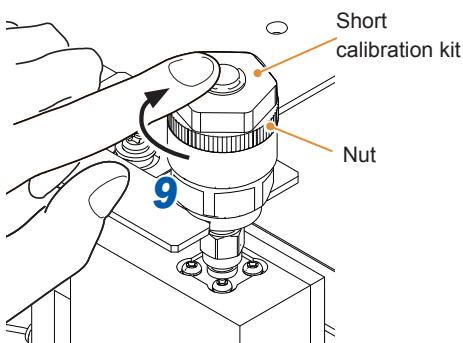


4 Place the open calibration kit on the reference surface.

5 As shown in figure, connect by turning only the nut of open calibration kit while pressing the convex portion on the top part of the open calibration kit.

The convex part of the open calibration kit is connected with the internal conductor. If the calibration kit is rotated without pressing the convex part, the internal conductors of calibration kit and adapter may graze each other, and the calibration kit and adapter may get damaged.

6 Execute open calibration by using the impedance analyzer.



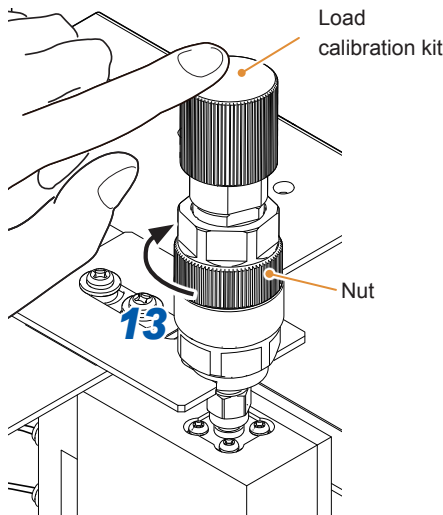
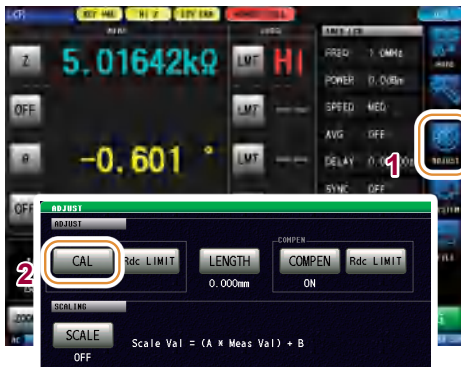
7 Remove the open calibration kit by turning the nut of the open calibration kit.

8 Place the short calibration kit on the reference surface.

9 As shown in figure, connect by turning only the nut of short calibration kit while pressing the convex portion on the top part of the short calibration kit.

The convex part of the short calibration kit is connected with the internal conductor. If the calibration kit is rotated without pressing the convex part, the internal conductors of calibration kit and adapter may graze each other, and the calibration kit and adapter may get damaged.

10 Execute short calibration by using the impedance analyzer.



11 Remove the short calibration kit by turning the nut of the short calibration kit.

12 Place the load calibration kit on the reference surface.

13 As shown in figure, connect by turning only the nut of load calibration kit while pressing the top part of the load calibration kit.

If the top part of the load calibration kit is rotated, the internal conductors of the calibration kit and adapter may graze each other, and the calibration kit and adapter may get damaged.

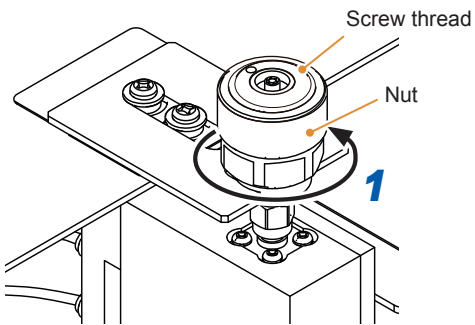
14 Execute load calibration by using the impedance analyzer.



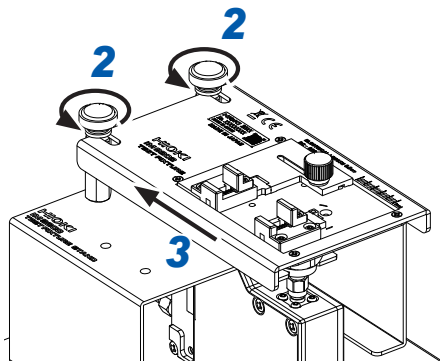
15 Remove the load calibration kit by turning the nut of the load calibration kit.

Attaching the Device

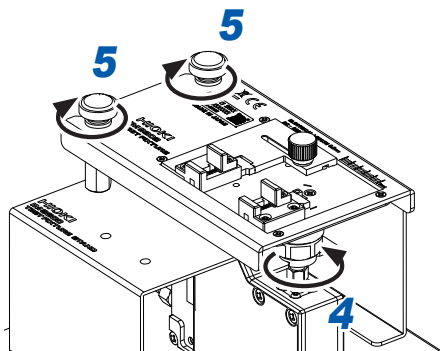
Attach the device to the IM9200 Test Fixture Stand and adapter.



- 1** Lower the screw thread by turning the nut of the IM9906 Adapter



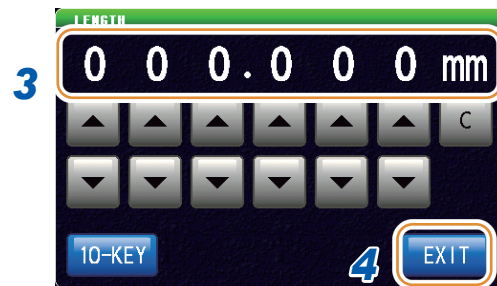
- 2** Loosen the stand fixing knob.
- 3** Place the device on the IM9200 Test Fixture Stand. As shown in figure, slide the notch part.



- 4** Turn the nut of the IM9906 Adapter and connect to the device.
- 5** Tighten the stand fixing knob.

Electrical Length Correction

The error, caused by the phase shift occurring between the calibration reference surface and the measurement DUT's connection surface is compensated.
 Set the electrical length correction to 0 mm in the impedance analyzer.



Short Correction

Short correction is performed to eliminate the device's residual short impedance. The short plate is used.

CAUTION



To prevent damage to the screw in the center of the short plate, orient the screw perpendicularly before insertion and tighten with an appropriate amount of force.

About short impedance

At high frequencies, a DUT's structure and dimensions exert a significant effect on impedance values.

DUTs have a variety of shapes and dimensions, and it is not possible to precisely define a short impedance that will accommodate all of those possibilities. Although short correction is performed to correct for the residual impedance of the test fixture, the fact that short impedance is undefined means measured values will incorporate an error component.

There are two methods for performing short correction of the test fixture.

- Using a short device with the same shape as the DUT

The value after short correction is the difference in impedance between the DUT and the short device. The short device's impedance will affect measured values.

- Using a fixed reference without regard to the size of the DUT

The value after short correction is the sum of the DUT's impedance and the impedance caused by the effects of the fixture's electrodes. The impedance of the fixture's electrodes affects measured values.

The device use a fixed reference to perform short correction without regard to the size of the DUT. Consequently, measured values include the impedance of part of the fixture's base plate and of the L-side electrode. Since a deterioration in the fixture's residual impedance will affect measured values, it is recommended to check the residual impedance on a daily basis.

You can also prepare your own short device with the same shape as the DUT you plan to measure and use it to perform short compensation.

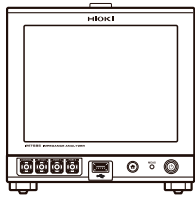
However, be sure to use the same correction method when comparing measured values.

IMPORTANT

Do not scratch the electrode and short plate of the device or touch them directly with your hand. It may affect the measurement accuracy and reproducibility.

You will need:

- Flat-head screwdriver ×1 (not included with the device)
- Short plate ×1
- Tweezers ×1 (This is not included with the device. Tweezers which are thinner than the DUT size, clean, and not magnetized are recommended.)

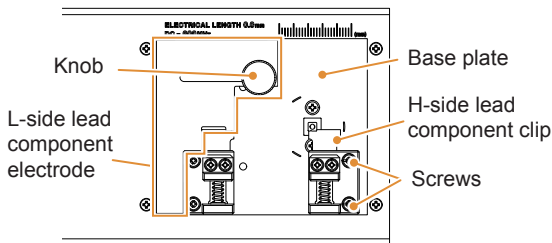


1 Set the reference value of correction (COMPEN) in the impedance analyzer.

By default, the impedance analyzer is configured using the values shown in the following table. Use the device's short correction and open correction defined values shown in the following table.

OPEN	G: 0 S, Cp: 0 F
SHORT	Rs: 0 Ω, Ls: 0 H

Electrodes and clips for lead component measurement

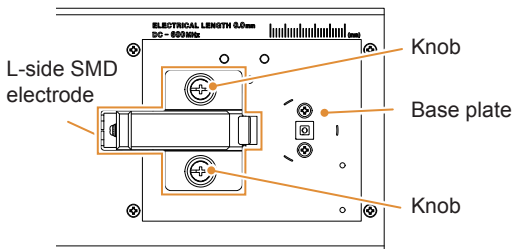


2 (If electrodes and clips for lead component measurement have been installed)

Remove the H-side lead component clip and L-side lead component electrode from the base plate.

Using a screwdriver, remove the H-side lead component clip. Turn the knob to remove the L-side lead component electrode.

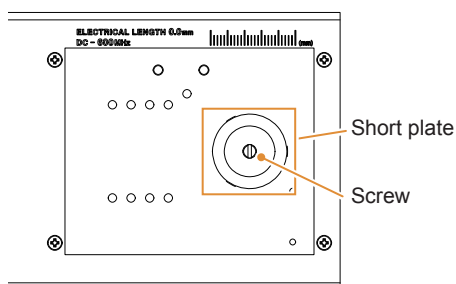
Electrodes for SMD measurement



(If the SMD measurement electrodes have been installed)

Remove the L-side SMD electrode from the base plate.

Turn the knob and remove the L-side SMD electrode.

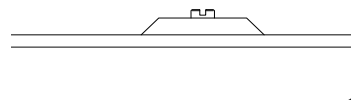


3 Using a flat-head screwdriver, install the short plate.

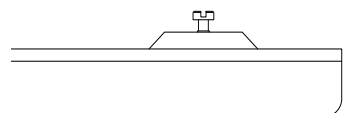
Tighten the short plate's screw to the correct position. If the screw catches partway, do not force it, but rather back it out and then attempt to tighten it again after inserting it in a perpendicular orientation.

View from beside the plate

Screw in correct position



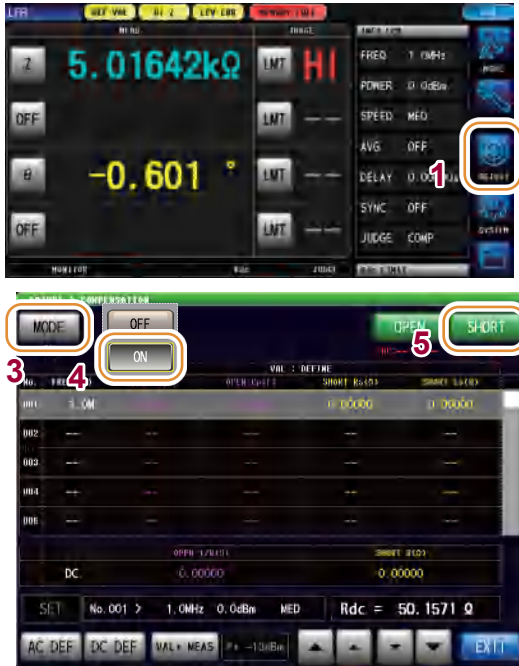
Partially tightened screw



4 Execute short correction by using the impedance analyzer.

When the correction cannot be executed:

- Confirm that the IM9906 Adapter is connected properly.
- Check that the DC measurement limit value of the impedance analyzer is appropriate.



5 Using a flat-head screwdriver, remove the short plate.

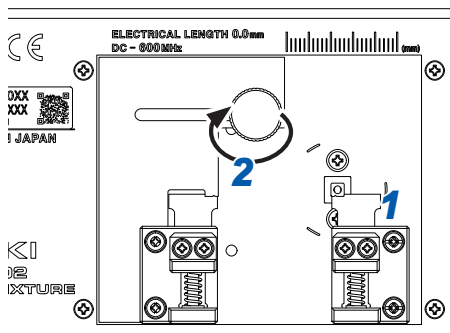
Open Correction

Open correction is performed to eliminate the device's residual open impedance. Open correction is performed by adjusting the electrode width based on the size of the DUT.

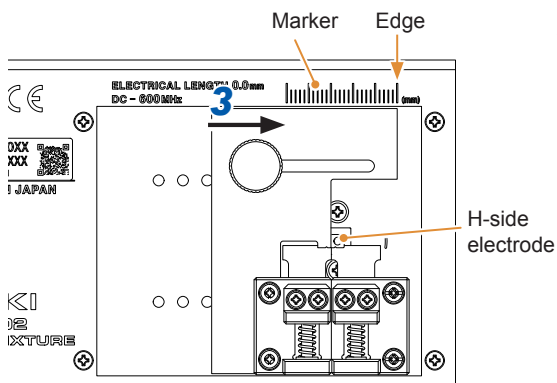
You will need:

- Phillips screwdriver ×1
- Tweezers ×1 (This is not included with the device. Tweezers which are thinner than the DUT size, clean, and not magnetized are recommended.)

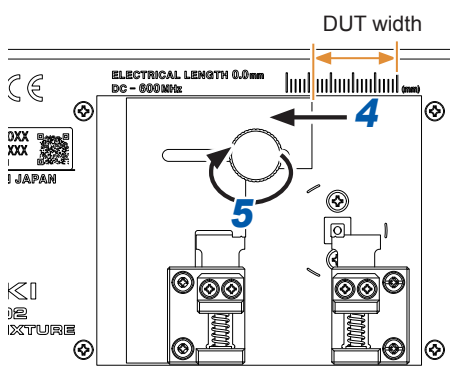
Measuring lead components



- 1** Using a phillips screwdriver, install the H-side lead component clip.
- 2** Gently tighten the knob that holds the L-side lead component electrode in place.

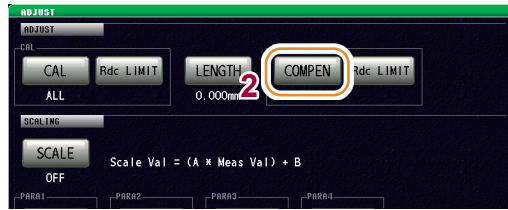


- 3** Slide the L-side lead component electrode all the way to the H-side electrode.
Check where the edge of the H-side electrode falls on the marker located on upper right to ascertain the DUT's width.



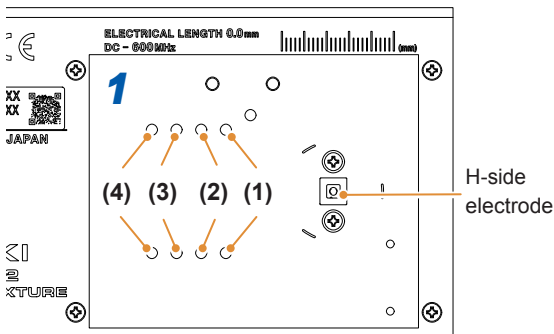
- 4** Slide the L-side lead component electrode to the left until the distance between the edge of the moving plate and the edge of the marker is equal to the DUT width.
- 5** Lock the L-side lead component electrode in place with the knob.

6 Start the open correction in the impedance analyzer.



When correction cannot be executed, check that the DC measurement limit value of the impedance analyzer is appropriate.

Measuring SMDs

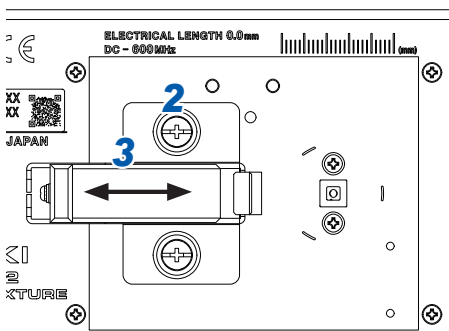


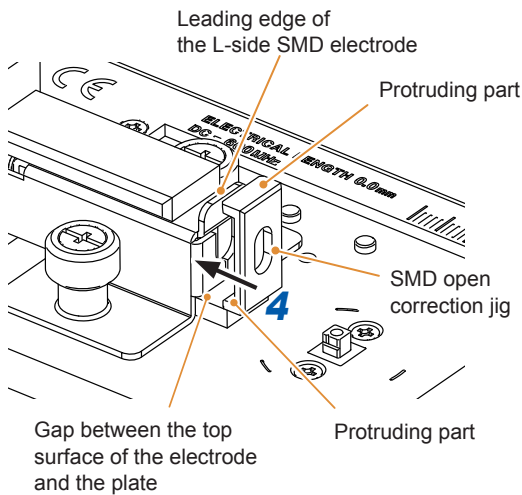
1 Choose the best L-side SMD electrode lock position from (1) through (4) as shown in the figure on the left based on the SMD's dimensions (width).

Lock position for the L-side SMD electrode	SMD dimensions (width)
(1)	1.6 mm to 7 mm
(2)	7 mm to 12.5 mm
(3)	12.5 mm to 18 mm
(4)	18 mm to 23 mm

2 Install the L-side SMD electrode while pressing down on and turning the knob.

3 Pull the lever on the L-side SMD electrode toward you to align the DUT interval with the electrode width.

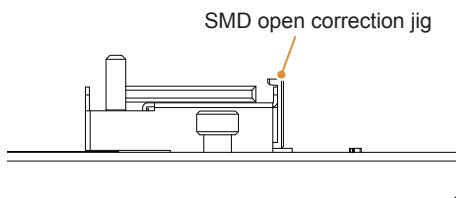




4 Install the SMD open correction jig and lock the electrode in place.

Firmly push the protruding part of the SMD open correction jig into the gap between the top surface of the L-side SMD electrode and the plate. Catch the other protruding part on the leading edge of the L-side SMD electrode.

View from the side with the jig installed



If you're unable to secure electrode position sufficiently, you'll need to replace the SMD open correction jig. Please contact your authorized Hioki distributor or reseller.

5 Start the open correction in the impedance analyzer.



When correction cannot be executed, check that the DC measurement limit value of the impedance analyzer is appropriate.

6 Remove the SMD open correction jig.

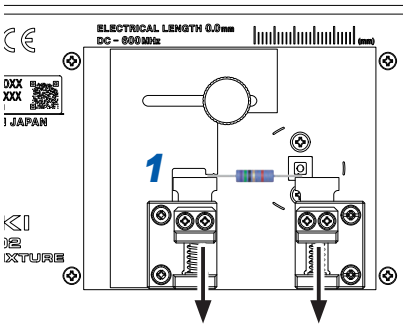
Starting Measurement

Lock the DUT in place and start measurement.

You will need:

- Tweezers ×1 (This is not included with the device. Tweezers which are thinner than the DUT size, clean and not magnetized are recommended.)
- DUT ×1

Lead components



- 1** Open the clip on the L-side lead component electrode and the H-side lead component clip and insert the component's lead wires into the electrodes.
- 2** Start the measurement using the impedance analyzer.

IMPORTANT

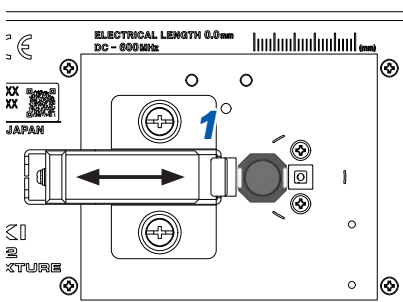
To boost measurement reproducibility, use the same component position, orientation, and lead connection locations when measuring components with the same shape.

SMDs

! CAUTION



Do not measure components that would readily deform in shape or suffer damage when subjected to force. Doing so may cause damage the component.



- 1** Operate the lever on the L-side electrode to sandwich the component between the H-side electrode and the L-side SMD electrode.
Verify that the edge of the L-side SMD electrode is in contact with the base plate. Proper measurement cannot be performed if the edge of the electrode is floating relative to the base plate.
- 2** Start the measurement using the impedance analyzer.

IMPORTANT

- To boost measurement reproducibility, use the same component position and orientation when measuring components with the same shape.
- If the L-side SMD electrode is exhibiting unstable contact, the SMD open correction jig can be used to improve contact.
- The impedance of some DUTs varies with the amount of force exerted on the DUT. Reducing the amount of force applied between the fixture's electrodes and the DUT's electrodes can lead to increased measurement error by increasing the contact resistance between the electrodes. Adjust the force and contact after assessing how the component in question will be affected by force.

Specifications

General Specifications

Operating environment	Indoors, Pollution Degree 2, altitude up to 2000 m (6562 ft.)
Operating temperature and humidity range	According to the operating temperature and humidity, and accuracy guarantee for temperature and humidity of connectable measuring instrument.
Storage temperature and humidity range	-10°C to 50°C (14°F to 122°F), 80% RH or less (non-condensing)
Dimensions	Approx. 135W × 82H × 37D mm (5.31"W × 3.23"H × 1.46"D) Depth varies with the electrodes in use.
Mass	Approx. 190 g (6.7 oz.)
Product warranty period	3 years Moving parts and parts that make contact with DUTs are not covered by the warranty.
Accessories and options	p.2

Measurement Specifications

Basic Specifications

Connectable measuring instruments	IM7580, IM7580A, IM7581, IM7583, IM7585, IM7587 (as of Jan. 2020) Connectable measuring instruments are subject to change. Please check Hioki's website for the latest information.
Connecting part to the DUT	2-terminal structure Lead components: The lead component's leads are pinched between the device's electrodes and clips. SMDs: The SMD is pinched between the device's electrodes.
Dimensions of measurable DUT	Lead components Axial Lead interval (component length): 1 mm to 25 mm Lead length: 2 mm to 10 mm Height to lead: 2.5 mm or shorter (The component's H-side lead must not make contact with the fixture's L-side electrode.) Lead wire diameter: 0.5 mm to 2 mm Radial Lead interval: 2 mm to 26 mm Lead length: 2 mm or longer (The electrode on the bottom surface of the H side of the component must not make contact with the fixture's L-side electrode.) Lead wire diameter: 0.5 mm to 2 mm SMD Component length: 1.6 mm to 23 mm Component width: 0.8 mm or longer Component height: 0.65 mm or longer (The component's H-side lead must not make contact with the fixture's L-side electrode.)
Measurable range (Z, θ)	According to the measurable range of connectable measuring instrument.
Used frequency range	DC to 600 MHz
Maximum applied voltage	±42 V peak
Electrical length	0 mm
Connector	7 mm connector

Residual parameters (reference value)

<p>Residual parameters Short inductance (Short plate)</p>	<p>Conditions</p> <ul style="list-style-type: none"> • Inductance value as seen from the 7 mm connector calibration surface (Electrical Length Correction 0 mm) Measurement parameter Ls • Short plate connection <p>1.6 nH ±1.1 nH: 30 MHz 1.6 nH ±0.8 nH: 100 MHz 1.6 nH ±0.7 nH: 300 MHz, 600 MHz</p>
<p>Residual parameters Short inductance (L-side lead component electrode)</p>	<p>Conditions</p> <ul style="list-style-type: none"> • Inductance value as seen from the 7 mm connector calibration surface (Electrical Length Correction 0 mm) Measurement parameter Ls • The L-side lead component electrode is directly connected to the H-side electrode. • The H-side clip is present. <p>1.2 nH ±1.1 nH: 30 MHz 1.2 nH ±0.8 nH: 100 MHz 1.2 nH ±0.7 nH: 300 MHz, 600 MHz</p>
<p>Residual parameters Short inductance (L-side SMD electrode)</p>	<p>Conditions</p> <ul style="list-style-type: none"> • Inductance value as seen from the 7 mm connector calibration surface (Electrical Length Correction 0 mm) Measurement parameter Ls • The L-side SMD electrode is directly connected to the H-side electrode. <p>1.2 nH ±1.1 nH: 30 MHz 1.2 nH ±0.8 nH: 100 MHz 1.2 nH ±0.7 nH: 300 MHz, 600 MHz</p>
<p>Residual parameters Open capacitance</p>	<p>Conditions</p> <ul style="list-style-type: none"> • Capacitance value as seen from the 7 mm connector calibration surface (Electrical Length Correction 0 mm) Measurement parameter Cp • Neither the L-side electrode nor the H-side clip is present. <p>1.3 pF ± 0.3 pF (30 MHz) 1.3 pF ± 0.2 pF (100 MHz, 300 MHz, 600 MHz)</p>

Maintenance and Service

CAUTION



Do not attempt to modify, disassemble, or try to repair the device. Doing so may cause a fire, electric shock, or injury.

Storage

If you do not intend to use the device for an extended period, store it in the carrying case.

Cleaning

- If the device becomes dirty, wipe the device clean with a soft cloth slightly moistened with water or a neutral detergent.
- The measurement accuracy and reproducibility of the device's electrode and short plate may decrease due to dirt or deformation. If dirt sticks to the device, remove it by using the provided cleaning brush.
- Remove the H-side lead component clip, the L-side lead component electrode, the L-side SMD electrode, and the short plate. Gently brush the H-side electrode and base plate.

Moving parts service life

- The performance of some parts used in the device may degrade during the course or extended use. When repair is necessary, please contact your authorized Hioki distributor or reseller.
- Service life varies with the operating environment and frequency of use. Please note that performance is not guaranteed for the duration of the recommended replacement cycle.

Parts	Recommended replacement cycle	Conditions
Base plate	10000 times	Number of times the L-side lead component electrode and L-side SMD electrode have slid back and forth
H-side lead component clip	10000 times	Number of open/close cycles
L-side lead component electrode	10000 times	Number of times slid back and forth over base plate
L-side lead component clip	10000 times	Number of times slid back and forth over base plate

Troubleshooting

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

Transporting

Be sure to follow these precautions:

- To avoid damaging the device, store it in the carrying case with the H-side lead component clip and the L-side lead component electrode connected to the base plate and with the electrode locked in place with the knob. Remove the short plate and L-side SMD electrode.
- Keep the removed accessories in the original packing materials in which it was shipped, and store in the carrying case. Additionally, be sure to double box the device. Accidental damage suffered in transit is not covered by the warranty.
- Attach a description of the issue when sending out your device for repair.

Disposal

Dispose of the device in accordance with local regulations.

Warranty Certificate

HIOKI

Model	Serial number	Warranty period Three (3) years from date of purchase (___ / ___)
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Customer name: _____

Customer address: _____

Important

- Please retain this warranty certificate. Duplicates cannot be reissued.
- Complete the certificate with the model number, serial number, and date of purchase, along with your name and address. The personal information you provide on this form will only be used to provide repair service and information about Hioki products and services.

This document certifies that the product has been inspected and verified to conform to Hioki's standards.

Please contact the place of purchase in the event of a malfunction and provide this document, in which case Hioki will repair or replace the product subject to the warranty terms described below.

Warranty terms

1. The product is guaranteed to operate properly during the warranty period (three [3] years from the date of purchase).
If the date of purchase is unknown, the warranty period is defined as three (3) years from the date (month and year) of manufacture (as indicated by the first four digits of the serial number in YYYY format).
2. If the product came with an AC adapter, the adapter is warranted for one (1) year from the date of purchase.
3. The accuracy of measured values and other data generated by the product is guaranteed as described in the product specifications.
4. In the event that the product or AC adapter malfunctions during its respective warranty period due to a defect of workmanship or materials, Hioki will repair or replace the product or AC adapter free of charge.
5. The following malfunctions and issues are not covered by the warranty and as such are not subject to free repair or replacement:
 - 1. Malfunctions or damage of consumables, parts with a defined service life, etc.
 - 2. Malfunctions or damage of connectors, cables, etc.
 - 3. Malfunctions or damage caused by shipment, dropping, relocation, etc., after purchase of the product
 - 4. Malfunctions or damage caused by inappropriate handling that violates information found in the instruction manual or on precautionary labeling on the product itself
 - 5. Malfunctions or damage caused by a failure to perform maintenance or inspections as required by law or recommended in the instruction manual
 - 6. Malfunctions or damage caused by fire, storms or flooding, earthquakes, lightning, power anomalies (involving voltage, frequency, etc.), war or unrest, contamination with radiation, or other acts of God
 - 7. Damage that is limited to the product's appearance (cosmetic blemishes, deformation of enclosure shape, fading of color, etc.)
 - 8. Other malfunctions or damage for which Hioki is not responsible
6. The warranty will be considered invalidated in the following circumstances, in which case Hioki will be unable to perform service such as repair or calibration:
 - 1. If the product has been repaired or modified by a company, entity, or individual other than Hioki
 - 2. If the product has been embedded in another piece of equipment for use in a special application (aerospace, nuclear power, medical use, vehicle control, etc.) without Hioki's having received prior notice
7. If you experience a loss caused by use of the product and Hioki determines that it is responsible for the underlying issue, Hioki will provide compensation in an amount not to exceed the purchase price, with the following exceptions:
 - 1. Secondary damage arising from damage to a measured device or component that was caused by use of the product
 - 2. Damage arising from measurement results provided by the product
 - 3. Damage to a device other than the product that was sustained when connecting the device to the product (including via network connections)
8. Hioki reserves the right to decline to perform repair, calibration, or other service for products for which a certain amount of time has passed since their manufacture, products whose parts have been discontinued, and products that cannot be repaired due to unforeseen circumstances.

HIOKI E.E. CORPORATION

<http://www.hioki.com>

18-07 EN-3

HIOKI

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