HIOKI

Instruction Manual

DT4211
DT4212

DIGITAL MULTIMETER

November 2013 Revised edition 1
DT4211A981-01 13-11H

Contents

Introduction

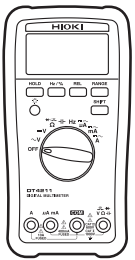
Thank you for purchasing the HIOKI DT4211 (Average value measurement model), DT4212 (True RMS measurement model) Digital Multimeter.
To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

Verifying Package Contents

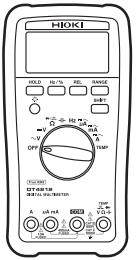
When you receive the instrument, inspect it carefully to ensure that no damage occurred during shipping.
In particular, check the accessories, panel switches, and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your authorized Hioki distributor or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

Check the package contents as follows.

☐ **DT4211 (Average value measurement model) or DT4212 (True RMS measurement model)**



DT4211
(Average value measurement model)



DT4212
(True RMS measurement model)

☐ **L9206 Test Lead (p. 27)**

☐ **R6P manganese battery × 2**

☐ **Instruction Manual**

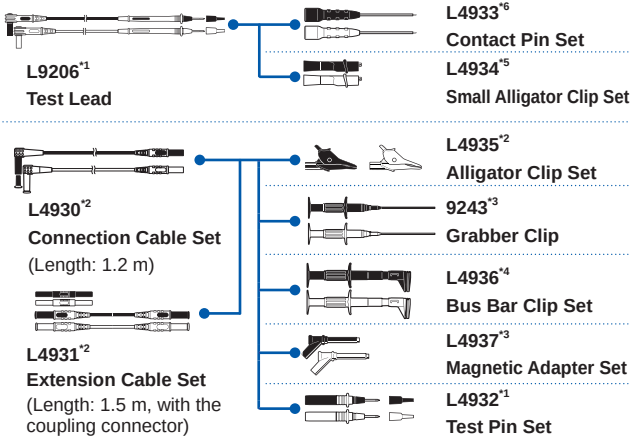
The holster has been attached.

Options (sold separately)

The following options are available for the instrument. Contact your authorized Hioki distributor or reseller when ordering.

Connecting cables

*1: CAT IV 600 V/CAT III 1000 V/CAT II 1000 V
*2: CAT IV 600 V/CAT III 1000 V
*3: CAT III 1000 V *5: CAT III 300 V/CAT II 600 V
*4: CAT III 600 V *6: AC33 V /DC70 V



Temperature measurement (Only the DT4212 (True RMS measurement model))

DT4910 Thermocouples (K) (p. 43)

- Temperature measuring junction: Exposed type (welding)
- Sensor length: Approx. 800 mm
- Operating temperature: -40°C to 260°C (temperature measuring part), -15°C to 55°C (connector)
- Allowable tolerance: ±2.5°C

Carrying Case

C0201 Carrying Case

The instrument, test leads, instruction manual, and others can be stored in the case.

C0202 Carrying Case

The instrument, test leads, instruction manual, and others can be stored in the case.

Z5004 Magnetic Strap

Attach this strap to the instrument and secure it on the wall surface such as a metal plate for use.
Handling the strap (p. 11)

For the detailed procedure of the C0201 Carrying Case and Z5004 Magnetic Strap, refer to our Website.

Safety Notes

This instrument is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, using the instrument in a way not described in this manual may negate the provided safety features.

Before using the instrument, be certain to carefully read the following safety notes.

⚠DANGER

Mishandling during use could result in injury or death, as well as damage to the instrument. Be certain that you understand the instructions and precautions in the manual before use.

⚠WARNING

With regard to the electricity supply, there are risks of electric shock, heat generation, fire, and arc discharge due to short circuits. If persons unfamiliar with electricity measuring instruments are to use the instrument, another person familiar with such instruments must supervise operations.

Protective gear

⚠WARNING

To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.

Notation

In this manual, 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 instrument or malfunction.
IMPORTANT	Indicates information related to the operation of the instrument or maintenance tasks with which the operators must be fully familiar.
	Indicates a high voltage hazard. If a particular safety check is not performed or the instrument is mishandled, this may give rise to a hazardous situation; the operator may receive an electric shock, may get burnt or may even be fatally injured.
	Indicates a strong magnetic-field hazard. The effects of the magnetic force can cause abnormal operation of heart pacemakers and/or medical electronics.
	Indicates prohibited actions.
	Indicates the action which must be performed.
*	Additional information is presented below.

Symbols affixed to the instrument

	Indicates cautions and hazards. When the symbol is printed on the instrument, refer to a corresponding topic in the Instruction Manual.
	Indicates that dangerous voltage may be present at this terminal.
	Indicates a double-insulated device.
	Indicates a fuse.
	Indicates a grounding terminal.
	Indicates DC (Direct Current).
	Indicates AC (Alternating Current).
	Indicates DC (Direct Current) or AC (Alternating Current).

Symbols for various standards

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

Accuracy

We define measurement tolerances in terms of rdg. (reading) and dgt. (digit) values, with the following meanings:

rdg.	(Reading or displayed value) The value currently being measured and indicated on the measuring instrument.
dgt.	(Resolution) The smallest displayable unit on a digital measuring instrument, i.e., the input value that causes the digital display to show a “1” as the least-significant digit.

Measurement categories

To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

⚠DANGER

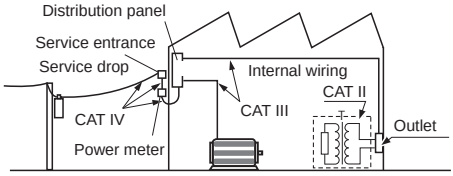
- **Using a measuring instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided.**
- **Using a measuring instrument without categories in an environment designated with the CAT II to CAT IV category could result in a severe accident, and must be carefully avoided.**

This instrument conforms to the safety requirements for CAT II 1000 V, CAT III 600 V measuring instruments.

CAT II: When directly measuring the electrical outlet receptacles of the primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)

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

CAT IV: When measuring the circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel)



Fixed installation

See: “2.3 Using Test Leads” (p. 26)

Usage Notes

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

⚠DANGER

If the test lead or the instrument is damaged, there is a risk of electric shock. Before using the instrument, perform the following inspection.

- **Before using the instrument, check that the coating of the test leads are neither ripped nor torn and that no metal parts are exposed. Using the instrument under such conditions could result in electrocution. Replace the test leads with those specified by our company.**
- **To avoid electric shock, check that the white or red portion (insulated layer) within the cable is not exposed. Do not use the cable if its internal colored portion is exposed.**
- **Before using the instrument the first time, verify that it operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your authorized Hioki distributor or reseller.**

Installation

Installing the instrument in inappropriate locations may cause a malfunction of instrument or may give rise to an accident. Avoid the following locations.

For details on the operating temperature and humidity, see the specifications. (p. 51)

⚠CAUTION

- Exposed to direct sunlight or high temperature
- Exposed to corrosive or combustible gases
- Exposed to water, oil, chemicals, or solvents
- Exposed to high humidity or condensation
- Exposed to a strong electromagnetic field or electrostatic charge
- Exposed to high quantities of dust particles
- Near induction heating systems (such as high-frequency induction heating systems and IH cooking equipment)
- Susceptible to vibration
- An unstable table or inclined surface

Using the instrument with the stand

⚠CAUTION

- Do not position the instrument on an unstable table or inclined surface.
- When the instrument is set on the stand, do not apply a strong force above. Doing so may damage the stand.

Handling the cables

⚠ WARNING

To prevent electric shock, when measuring the voltage of a power line use a test lead that satisfies the following criteria:

- **Conforms to safety standards IEC61010 or EN61010**
- **Of measurement category II or III**
- **Its rated voltage is higher than the voltage to be measured**

All of the optional test leads for this instrument conform to the safety standard EN61010. Use a test lead in accordance with its defined measurement category and rated voltage.

⚠ CAUTION

- Avoid stepping on or pinching the cable, which could damage the cable insulation.
- To avoid damaging the cables, do not bend or pull the leads and the probe bases.

The ends of the test leads are sharp. Be careful to avoid injury.

For the test leads supplied with the instrument or the options to be connected to the instrument, see the following information.

Accessories and options	Reference
Test lead	“2.3 Using Test Leads” (p. 26)
Thermocouples (K)	“3.10 Measuring Temperatures (DT4212)” (p. 43)

Handling the strap

⚠DANGER

Those with medical electronics such as pacemakers should not use the Z5004 Magnetic Strap. Nor should such persons approach the Z5004. It is extremely dangerous. The electronics may not operate properly and the life of the operator may be put at great risk.

⚠CAUTION

- Do not use the Z5004 in locations where it may be exposed to rainwater, dust, or condensation. In those conditions, the Z5004 may be decomposed or deteriorated. The magnet adhesion may be diminished. In such case, the instrument may not be hung in place and may fall.
- Do not bring the Z5004 near magnetic media such as floppy disks, magnetic cards, pre-paid cards, or magnetized tickets. Doing so may corrupt and may render them unusable. Furthermore, if the Z5004 is brought near precision electronic equipment such as PCs, TV screens, or electronic wrist watches, they may fail.

Precautions during measurement

⚠ WARNING

If the instrument is used in locations where the rating indicated on the instrument or probes is exceeded, the instrument may be damaged resulting in personal injury. Do not use the instrument in such locations. See “Measurement categories” (p. 7).

- **With regard to the 10 A range, the maximum input current is 10 A DC/10 Arms AC. Supplying a current in excess of the maximum input may damage the instrument and result in personal injury. Do not supply current in excess of the specified limit.**

Observe the following to avoid electric shock and/or short circuits.

- **Hazardous voltage may be generated in a free measurement terminal. Do not touch the free terminal.**
- **Use only test leads and optional equipment specified by our company.**
- **Do not allow the metal part of the test lead to touch any exposed metal, or to short between 2 lines. Never touch the metal end.**
- **When connecting the clip-type test lead to the active terminal, do not allow the lead to touch any exposed metal, or to short between 2 lines.**

⚠CAUTION

- Do not input voltage or supply current exceeding the specified measurement range. Doing so may damage the instrument.
- During the continuity check, diode test, or measurement of resistance or electrostatic capacity, measurement signals are generated in the terminals of the instrument. Depending on the target for measurement, the measurement signal may cause damage.
  Seeing “Measurement current” and “Open circuit voltage” in the accuracy table (p. 55), check, in advance, that there are no adverse effects of the measurement current and the open circuit voltage.

Precautions during shipment

Observe the following during shipment. Hioki cannot be responsible for damage that occurs during shipment.

⚠CAUTION

- During shipment of the instrument, handle it carefully so that it is not damaged due to a vibration or shock.
- To avoid damage to the instrument, remove the accessories and optional equipment from the instrument before shipment.

If the instrument is not to be used for an extended period of time

IMPORTANT

To avoid corrosion and/or damage to the instrument due to battery leakage, remove the batteries from the instrument if it is to be kept in storage for an extended period.

1 Overview

1.1 Overview and Features

This instrument is a multi-function digital multimeter that performs measurement functions for items such as voltage, current, resistance, and capacity.

Main features and functions

- Large display on which the measured values can be read easily
- Environmental performance (can be used anywhere) (Operation temperature: -10 to 50ºC (14°F to 122°F))
- Display hold (HOLD)
- Low power consumption for an extended time

Problem finding a suitable installation location?

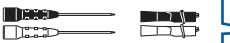
The strap with magnet allows the instrument to be hung conveniently.

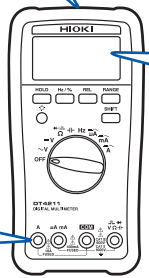
Large display of values

Backlighting to allow users to read the measurement values in dark environments

For various purposes

The measurement test leads and end pins can be selected.

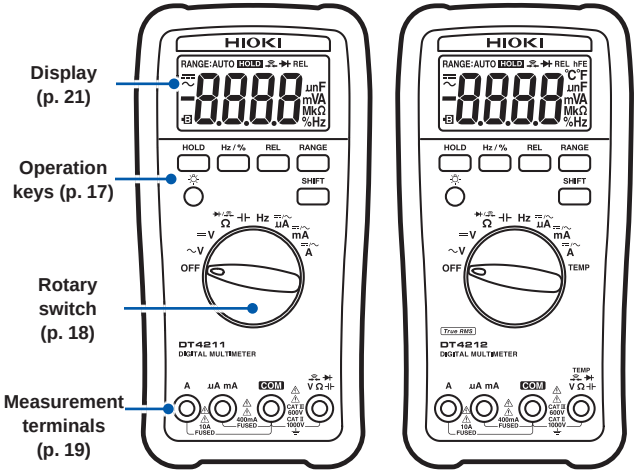




1.2 Parts Names and Functions

Front

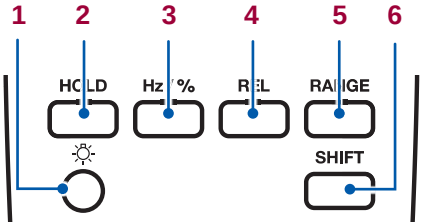
Some indications are different between the DT4211 (Average value measurement model) and DT4212 (True RMS measurement model)



DT4211
(Average value measurement model)

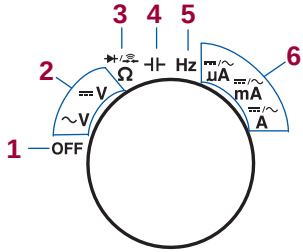
DT4212
(True RMS measurement model)

Operation keys

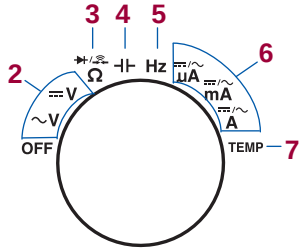


1	☼	Backlight key Turns on/off the backlight. (p. 49)
2	HOLD	Manually sets/cancels the hold function for the displayed value. (HOLD lights up/goes off.) (p. 46)
3	Hz/%	Switches the frequency (p. 39) and duty ratio (p. 40) display.
4	REL	Displays the relative value (REL). (p. 47) ([REL] lights up/goes off.)
5	RANGE	Sets the manual range and switches the range. (p. 45) (Turns on/off the [RANGE:AUTO]) Cancels the manual range. (Pressed down for at least 1 second.)
6	SHIFT	Switches the function. Cancels the auto power save function (APS). (Power-on option)

Rotary switches and measurement descriptions



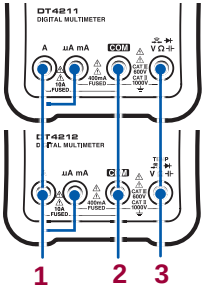
DT4211
(Average value measurement model)



DT4212
(True RMS measurement model)

		Function	DT4211	DT4212
1	OFF			
2	∼V	AC voltage and frequency measurement	√	√
	⎓V	DC voltage measurement	√	√
3	Ω	Resistance measurement	√	√
	▶|	Diode test	√	√
	)))	Continuity check	√	√
4	⊣⊢	Electrostatic capacity	√	√
5	Hz	Frequency and duty ratio measurement	√	√
6	⎓/∼ µA	DC (µA) measurement/AC (µA) measurement	√	√
	⎓/∼ mA	DC (mA) measurement/AC (mA) measurement	√	√
	⎓/∼ A	DC (A) measurement/AC (A) measurement	√	√
7	TEMP	Temperature measurement	-	√

Measurement terminals



DT4211
(Average value measurement model)

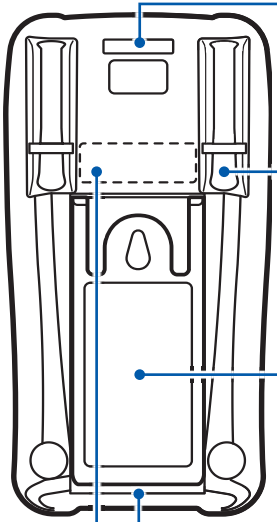
DT4212
(True RMS measurement model)

1	Current measurement terminal. Hereafter referred to as “A terminal (μA terminal, mA terminal)”. The red test lead is connected.
2	Commonly used for each measurement. Hereafter referred to as “COM terminal”. The black test lead is connected.
3	Used for voltage measurement, resistance measurement, continuity check, diode test, temperature measurement, or electrostatic capacity measurement. Hereafter referred to as “V terminal”. The red test lead is connected.

Be sure to carefully read the following precautions for the terminals with the ⚠ marking.

- “Precautions during shipment” (p. 13)
- “6.3 Replacing Fuses” (p. 67)

Rear



Strap hole
The optional Z5004 Magnetic Strap can be attached.

Test lead holder
The test lead can be held.

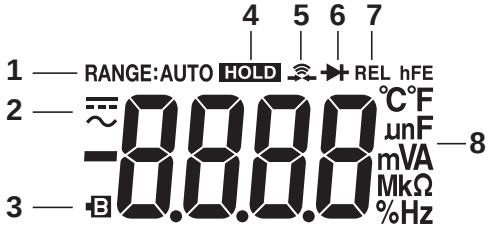
Stand
The instrument can be set on the stand.

Battery cover
When replacing the batteries (p. 24) or fuse (p. 67), remove the cover.

⚠ See p. 24.

Serial number label
It is necessary for production control such as product warranty. Do not peel off the label. Before checking the serial number, remove the holster.

1.3 Display



1	RANGE:AUTO	Auto range (p. 45)
2	⎓ ~	DC, AC
3	B	Battery warning indicator Lights up when the battery voltage falls below the voltage at which accuracy is guaranteed (2.4 V ± 0.15 V).
4	HOLD	Retention of the measured value. (p. 46)
5		Continuity check (p. 37)
6		Diode (p. 36)
7	REL	Relative value display (p. 47)
8	Each measurement unit	

2 Preparation for Measurements

2.1 Measurement Workflow

Before using the instrument, be sure to read “Usage Notes” (p. 8).

Installation and connection

Insert the batteries. (p. 24)

↓

Perform the startup check. (p. 29)

↓

As necessary, have other optional items available and ready.

Measurement

Turn on the power and select the measurement function.

↓

Attach the test leads to the measurement terminals. (p. 26)
(As necessary, perform zero adjustment. (p. 48))

↓

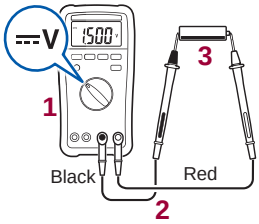
Connect the test leads to the measurement object.

↓

(As necessary)

Hold the display of the measured value. (p. 46)

↓



To ensure safe operation, make sure to select a measurement function and then connect the test leads to the measurement object.

End of the measurement

Move the test leads away from the measurement object and then turn off the power.

2.2 Inserting/Replacing Batteries

Before using the instrument for the first time, insert 2 R6P manganese batteries or LR6 alkaline batteries. Before measurements, check that the battery level is sufficient. When the battery charge is low, replace the batteries.

⚠ WARNING

To avoid electric shock, disconnect the test leads from the object to be measured before replacing the batteries.

To avoid the possibility of explosion, do not short circuit, charge, disassemble, or incinerate batteries.

After battery replacement but before using the instrument, reattach and screw down the battery cover.

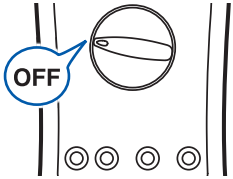
⚠ CAUTION

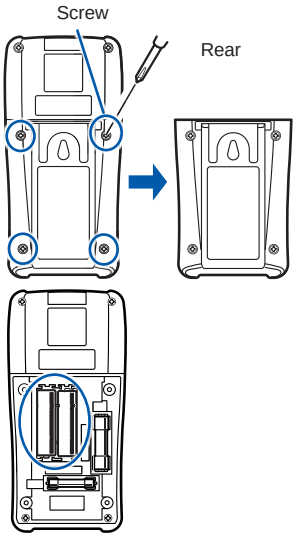
Poor performance or damage from battery leakage could result. Observe the cautions listed below.

- Do no mix new and old batteries, or different types of batteries.
- Be careful to observe the battery polarity during installation.
- Do not use batteries after their recommended expiry date.
- Do not allow used batteries to remain in the instrument.

- To avoid corrosion from battery leakage and/or damage to the instrument, remove the batteries from the instrument if it is to be kept in storage for an extended period.

- B lights up when the batteries are exhausted. The accuracy is not guaranteed. Replace the battery immediately.
- After use, be sure to turn off the instrument.
- Handle and dispose of batteries in accordance with local regulations.





1. **Have the following items available and ready.**
   - Phillips screwdriver
   - R6P manganese battery × 2 or LR6 alkaline battery × 2
2. **Remove the test leads from the instrument.**
3. **Set the rotary switch to OFF.**
4. **Remove the holster.**
5. **Using a Phillips screwdriver remove the screws (4 locations) from the battery cover on the rear of the instrument.**
6. **Remove the battery cover.**
7. **Remove all of the old batteries.**
8. **Insert 2 new batteries (R6P), being careful to the battery polarity.**
9. **Reattach the battery cover.**
10. **Secure the cover with the screw.**
11. **Reattach the holster.**

After the battery cover is removed, the fuse can be seen. When replacing the fuse, see “6.3 Replacing Fuses” (p. 67).

2.3 Using Test Leads

The L9206 Test Leads supplied with the instrument are used for measurements.
Depending on measurement locations, use our optional measurement cables. For details on the optional items, see “Options (sold separately)” (p. 2).

⚠DANGER

To avoid electric shock, do not short circuit the line on which voltage is applied at the tip of the test lead.

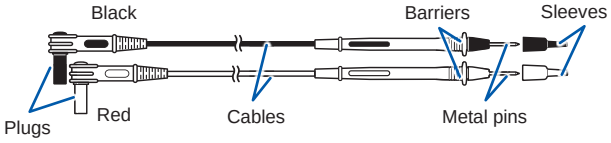
⚠WARNING

- **To prevent a short circuit accident, be sure to use the test leads with the sleeves attached when performing measurements in the CAT III measurement category. (See “Measurement categories” (p. 7))**
- **If the sleeves are inadvertently removed during measurement, stop the measurement.**
- **When connecting the lead, use the correct voltage measurement terminal (V terminal) and current measurement terminal (A terminal). If an incorrectly connected lead is used, the instrument may be damaged or short circuit accidents may occur.**
- **Use only test leads and optional equipment specified by our company.**

⚠CAUTION

- To ensure safe operation, use only test leads specified by our company.
- When carrying out measurements with the sleeves in place, be careful to avoid damaging the sleeves.
- The tips of the metal pins are sharp and may cause injury. Do not touch the tips.

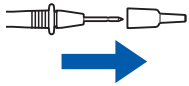
L9206 Test Lead



Metal pin	Connect to the object to be measured. 4 mm or less (sleeve attached) 19 mm or less (sleeve removed) Diameter ϕ approx. 2 mm
Sleeve	Attach to the metal pins to prevent short circuit accidents.
Barrier	Represents the safe handling distance from the metal pins. **During measurement, do not touch the area between the barrier and the tip of the sleeve.**
Plug	Connect to the measurement terminals on this instrument.
Cable	Double sheathed cables (Length: approx. 980 mm, Diameter: ϕ approx. 3.5 mm) **When the white portion inside the cable is exposed, replace with a new L9206 Test Lead.**

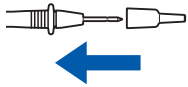
Removing and attaching the sleeves

Removing the sleeves



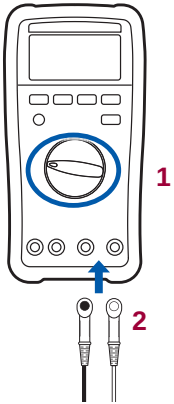
Gently hold the bottom of the sleeves and pull the sleeves off. Safely store the removed sleeves so as not to lose them.

Attaching the sleeves



Insert the metal pins of the test leads into the holes of the sleeves, and firmly push them all the way in.

Connecting to the instrument



1 **Turn the rotary switch to the desired measurement function.**

2 **Connect the test leads to the relevant measurement terminals.**

- Except the current measurement

COM terminal	Connect the black test lead.
V terminal	Connect the red test lead.

- Current measurement

COM terminal	Connect the black test lead.
µA/mA terminal	Connect the red test lead.
A terminal	

3 Performing Measurements

3.1 Inspection Before Use

Before using the instrument the first time, verify that it operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your authorized Hioki distributor or reseller.

Appearance check of the instrument and test leads

Check item	Action
The instrument is neither damaged nor cracked. The internal circuits are not exposed.	Visually check the instrument. If it is damaged, there is a risk of electric shock. Do not use the instrument but send it for repair.
The terminals are not contaminated with debris.	Remove contamination with a cotton swab.
The coating of the test leads is neither broken nor frayed, or the white portion or metal part within the lead is exposed.	If the test lead is damaged, there is a risk of electric shock. Do not use the instrument but send it for repair.

Check when turning on the power

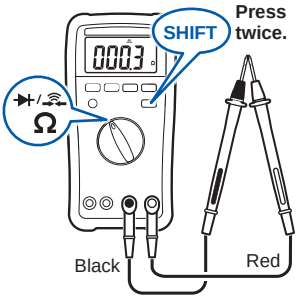
(Set the rotary switch to any position other than OFF.)

Check item	Action
The battery voltage is sufficient.	When B appears at the left bottom of the display, the battery voltage is low. The accuracy is not guaranteed. Replace the battery immediately.

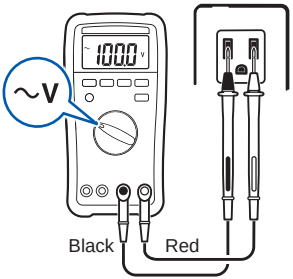
Operation check

This section introduces some of the operation checks. Periodical calibration is necessary in order to ensure that this instrument operates according to its specifications.

1 Check that the test leads are not broken.

Check method	Action
Regarding the continuity check, deliberately short circuit the test leads and then check the display.  	**Normal:** A buzzer sounds and the value stabilizes at around 0Ω. **Abnormal:** A buzzer does not sound and a numeric value other than the above appears. **Corrective action:** The test leads may be broken. Replace with those specified by our company. If the same phenomena persist even after the test leads are replaced, a malfunction may occur. Halt inspection and then send the instrument for repair.

2 Measure samples (such as battery, commercial power supply, and resistor) of which values have already been known, and check that the appropriate values appear.

Check method	Action
Example: Perform the AC voltage measurement to measure the commercial power supply, and then check the display.  	**Normal:** An already-known value appears. (In this example, the commercial voltage level should appear.) **Abnormal:** The measured value does not appear. The malfunction may occur. Stop the inspection and do not use the instrument.

3 Check that the fuse is not broken.

Check method	Action
1. Remove the fuse from the instrument. (p. 67) 2. Reattach the battery cover. 3. In the resistance measurement, check the resistance of the fuse. (Resistance measurement (p. 35))	**Normal:** **Fuse rating** / **Resistance** 630 mA / Approx. 1.0Ω 10 A / Approx. 0.1Ω **Abnormal:** If the value above is not obtained (the value higher than that is displayed), replace the fuse. (p. 67)

Before measurements

⚠ WARNING

Observe the following to avoid short circuit accidents.

- **Always verify the appropriate setting of the rotary switch before connecting the test leads.**
- **Disconnect the test leads from the measurement object before switching the rotary switch.**
- **Operate or connect the instrument by following the procedure of each measurement example (or procedure steps).**

3.2 Measuring Voltage

The AC/DC voltage can be measured. Furthermore, the AC frequency and duty ratio can be checked.

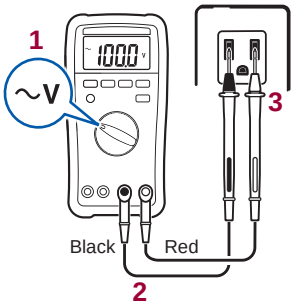
Before measurements

⚠ WARNING

If the instrument is used in locations where the rating indicated on the instrument or probes is exceeded, the instrument may be damaged resulting in personal injury. Do not use the instrument in such locations. See “Measurement categories” (p. 7).

The autoranging function of this instrument automatically selects the optimum measurement range. To change the range arbitrarily, use the manual range. (p. 45)

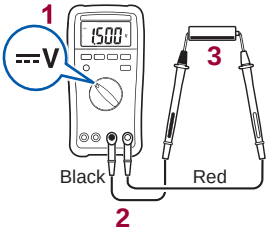
Measuring AC voltage



The AC voltage is measured.
The measured value is an average rectifying RMS indication (DT4211) or true RMS indication (DT4212). (p. Appx.1)

When the **Hz/%** key is pressed, the frequency and duty ratio can be measured. (p. 40)

Measuring DC voltage



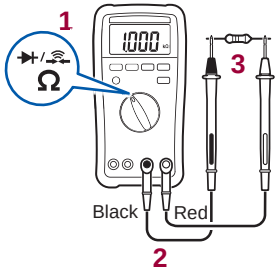
Measure the DC voltage.

3.3 Measuring Resistance

Resistance is measured.

⚠ WARNING

Before measuring, be sure to turn off the power to the measurement circuit. Otherwise, electric shock may occur or the instrument may be damaged.



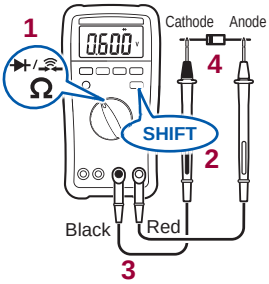
The open terminal voltage is approx. 0.5 V or less. The measurement current (DC) varies depending on the range. To avoid damage to the measurement object, check the specifications before use.

3.4 Measuring Diode

The forward voltage of the diode is measured.
If the forward voltage is within the range from 0 V to 1 V, the forward voltage is displayed.

⚠ WARNING

Before measuring, be sure to turn off the power to the measurement circuit. Otherwise, electric shock may occur or the instrument may be damaged.



In the case of the opposite connection

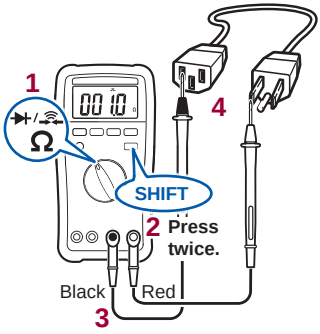
The open terminal voltage is approx. 3.0 V or less.
To avoid damage to the measurement object, check the specifications of the measurement object before use.

3.5 Checking Continuity

The input short circuit is detected and informed via a buzzer.

⚠ WARNING

Before measuring, be sure to turn off the power to the measurement circuit. Otherwise, electric shock may occur or the instrument may be damaged.



A buzzer sounds during continuity (short circuit detection), and the resistance is displayed.
(400Ω range fixed)

Detection	Threshold	Buzzer
Short circuit detection	90Ω±40Ω or less	Sounds (continuous buzzer sound)

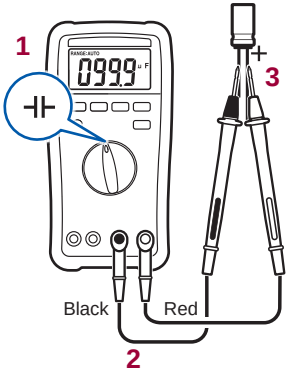
3.6 Measuring Electrostatic Capacities

The capacity of the capacitor is measured.

⚠ WARNING

Before measuring, be sure to turn off the power to the measurement circuit. Otherwise, electric shock may occur or the instrument may be damaged.

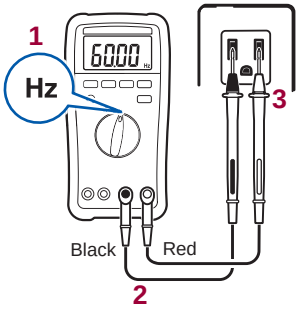
Do not measure the capacitor which has been charged.



- **When measuring the polar capacitor**
  Connect the V terminal (red test lead) to the + terminal of the capacitor and the COM terminal (black test lead) to the - terminal.
- For components on a circuit board, measurement may not be possible due to the effect of the peripheral circuit.

3.7 Measuring Frequencies

The frequency of the measured signal (square wave) is also measured. The frequency display is auto-ranging.



When measuring frequencies of AC voltage and AC current

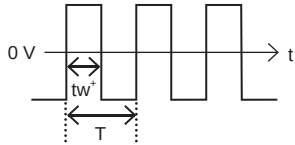
For the AC voltage measurement, use the ACV setting, and for the AC current measurement, use the ACμA, ACmA, or ACA setting. The frequency can be checked by pressing the **Hz/%** key ([Hz] lights up). The voltage (current) range is fixed to the range before the **Hz/%** key is pressed.

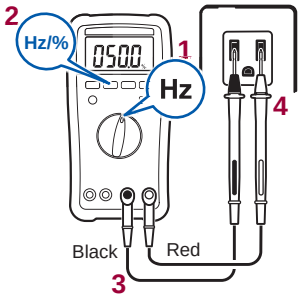
- If signals out of the range of frequency measurement are measured, the display becomes unstable. Be aware of this point.
- The sensitivity of the frequency measurement is regulated by range. (Minimum sensitivity voltage (p. 58)
  When the value is less than the minimum sensitivity voltage (current), the indicated value may fluctuate. When the voltage (current) range is lowered, the value stabilizes. This does not apply to cases where the value fluctuates due to noise.
- During the measurement of low frequency voltage (current), if the auto range does not stabilize and the frequency cannot be measured, change the voltage (current) range and measure again.

3.8 Measuring Duty Ratio

The duty ratio (or duty factor) indicates the ratio of the pulse width and pulse repetition frequency. The instrument displays the ratio as a percentage (%).

Duty ratio for the plus slope (D+): D+ = tw+/T ×100 (%)





The duty ratio for the pulse is measured.

When measuring duty ratio of AC voltage and AC current

For the AC voltage measurement, use the ACV setting, and for the AC current measurement, use the ACμA, ACmA, or ACA setting. The duty ratio can be checked by pressing the **Hz/%** key twice. The voltage (current) range is fixed to the range before the **Hz/%** key is pressed.

3.9 Measuring Current

DC/AC is measured. DC and AC are switched with the **SHIFT** key.

⚠DANGER

- **Do not input any voltage to the current measurement terminals.**
  Doing so may result in short circuit accidents.
- **To avoid electrical accidents, turn off the power to the circuit before measuring and then connect the test leads.**

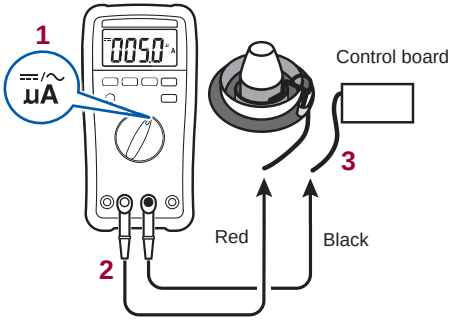
Measuring DC/AC

Function

- **µA** Selected to measure 4000 µA DC/AC or less.
- **mA** Selected to measure 400.0 mA DC/AC or less.
- **A** Selected to measure 10 A DC/AC or less.

When measuring an unknown current
Set to the high range.

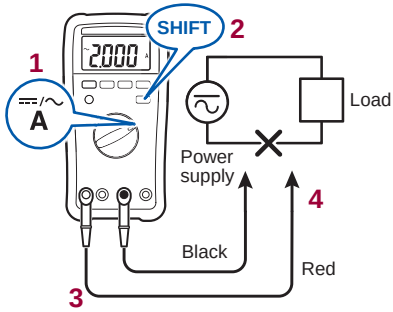
Measuring with the µA range



Example: Measuring the current of the burner flame (**µA**)

The measured current value of the burner flame varies with the input impedance of the instrument.
The µA input impedance of this instrument is approx. 100Ω.

Measuring with the A range

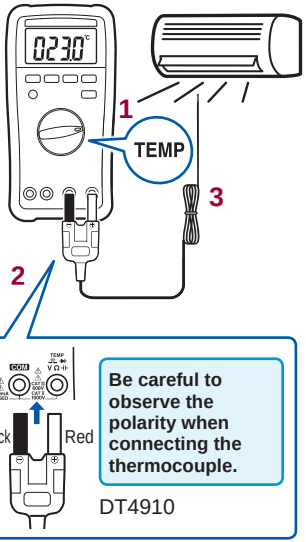


3.10 Measuring Temperatures (DT4212)

Using our optional DT4910 Thermocouples (K), temperatures can be measured.

⚠CAUTION

To avoid damage to the instrument, do not input any voltage or supply current to the thermocouple.



Checking the temperature change

It can be checked in the relative value display. (p. 47)

When measuring temperatures with the thermocouple applied to the surface of the measurement object

Clean the surface so that the thermocouple can make contact with the object securely.

If temperature is not measured after the thermocouple is attached

The instrument or thermocouple may be malfunctioning.
Check this with the following procedure.

Short-circuit the V terminal of the instrument using the test leads.

The ambient temperature is displayed.	The thermocouple may be malfunctioning (blown). Replace the thermocouple with a new one.
The ambient temperature is not displayed.	The instrument is malfunctioning. Send it for repair.

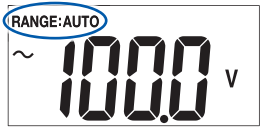
4 Using Instrument Conveniently

4.1 Selecting the Measurement Range

Auto or Manual range can be selected.

- Auto range — Sets the optimum range automatically in accordance with the actual measurement.
- Manual range — Sets the specific range manually.

Measuring with the auto range



[RANGE: AUTO] lights up.

When the measurement function is switched using the rotary switch, the auto range is enabled.

Measuring with the manual range

Press the RANGE key.

[RANGE: MANUAL] lights up.

Each time the **RANGE** key is pressed, a higher range is specified. When the key is pressed at the highest range, the lowest range is specified once again.

Example: When the range is 400.0 mV to 1000 V

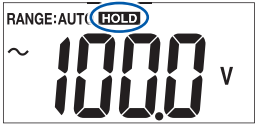
400.0 mV → 4.000 V → 40.00 V → 400.0 V → 1000 V → 400.0 mV

To switch from the manual range to the auto range, press the **RANGE** key for at least 1 second.

4.2 Retaining the Measured Value

When **HOLD** is pressed, the measured value is retained. (HOLD lights up.)

Retaining the measured value (HOLD)



To retain the measured value, press the HOLD key.

(HOLD lights up and the measurement value is retained.)

To cancel the hold state, press it again.
(HOLD goes off.)

4.3 Checking the Relative Value/ Performing Zero Adjustment

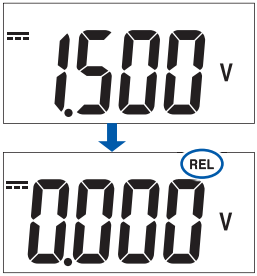
The relative value comparing to the standard value can be checked (relative function).
It can also be used as the zero adjustment function.
Zero adjustment eliminates the influences of the test lead wiring resistance (continuity, resistance measurement) and the wiring capacity (capacitor measurement).

This function is disabled under the following conditions.

During OL display, frequency measurement, and duty measurement

Checking the relative value (REL)

Example: DC voltage measurement



When the standard value is measured, press REL for at least 1 second.

(**REL** lights up.)

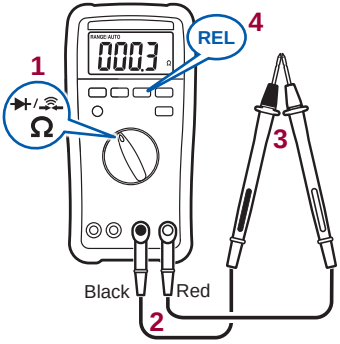
The relative value is displayed.
To cancel the display, press it again.
(**REL** goes off.)

- When the relative function is performed, the auto range is canceled. (However, this excludes the capacity measurement function.)
- Do not input values exceeding 4000 counts for the DC voltage, DC current, and temperature measurement (only the DT4212).

Performing zero adjustment

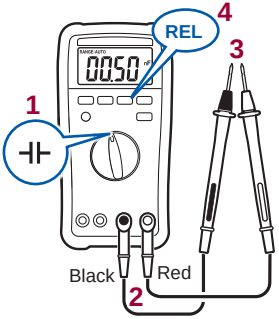
When performing zero adjustment, the condition of the test leads varies depending on the measurement function.
Perform zero adjustment, referring to the table below.

Measurement function	V, Ω, , A	⊣⊢
Condition of the test leads	Short circuit	Open



Example 1: Resistance measurement

1. **Select the measurement function.**
2. **Connect the test leads to the measurement terminals.**
3. **Allow the test leads to short circuit.**
4. **Press the REL key.**
(After zero adjustment: 0.0Ω)
5. **Measure the resistance.**



Example 2: Capacitor measurement

1. **Select the measurement function.**
2. **Connect the test leads to the measurement terminals.**
3. **Allow the test leads to open.**
4. **Press the REL key.**
(After zero adjustment: 0.00 nF)
5. **Measure the capacitor.**

4.4 Turning On the Backlight

The backlight can be turned on/off by pressing the backlight key.

The backlight automatically turns off if the instrument is not operated for approx. 80 seconds.

4.5 Using the Auto Power Save (APS)

The auto power save function saves on battery consumption. If the instrument has not been operated for approx. 30 minutes, it enters the sleep mode.
In the default setting, the auto power save function is set to enabled.

To continuously use the instrument, press any key or turn the rotary switch.

Auto power save function

- When the instrument is in the sleep mode, press any key or turn the rotary switch to recover from the sleep mode.
- If the instrument will be used for an extended period of time, disable the auto power save function.
- After use, set the rotary switch to OFF. The sleep mode consumes a small amount of current.

Canceling the auto power save function (APS)

While pressing the **SHIFT** key, turn the rotary switch.

5 Specifications

5.1 General Specifications

Power supply	R6P manganese battery × 2 or LR6 alkaline battery × 2
Battery indicator warning voltage	B lights up when 2.4 V ± 0.15 V or less
Dimensions	Approx. 91.6 W × 180.6H × 57.1 D mm (3.61″ W × 7.11″ H ×2.25″ D) (including the holster)
Mass	Approx. 388 g (13.7 oz.) (including the batteries and holster)
Operating environment	Indoors, 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) (However, 0°C to 50°C (32°F to 122°F) for the temperature function) • Humidity 0°C to 40°C (32°F to 104°F): 80% RH or less (non-condensating) 40°C to 45°C (104°F to 113°F): 60% RH or less (non-condensating) 45°C to 50°C (113°F to 122°F): 50% RH or less (non-condensating) • Humidity (40MΩ range) 0°C to 30°C (32°F to 86°F) : 80% RH or less (non-condensating) 30°C to 40°C (86°F to 104°F) : 70% RH or less (non-condensating) 40°C to 45°C (104°F to 113°F) : 60% RH or less (non-condensating) 45°C to 50°C (113°F to 122°F) : 50% RH or less (non-condensating)
Storage temperature and humidity	-20°C to 60°C (-4°F to 140°F), 80% RH or less (non-condensating)

Dustproof and waterproof	IP40 (EN60529)
Product warranty period	3 years (excluding the measurement accuracy)
Accessories	• L9206 Test Lead • Holster (attached to the instrument, with a test lead holder) • Instruction Manual • R6P manganese battery × 2 (not installed in the instrument)
Options	See: “Options (sold separately)” (p. 2)
Replacement parts	630 mA/1000 V fuse for current terminal (μA, mA) (Breaking capacity 50 kA Fast-blow type: ϕ6.3 × 32 mm, SIBA) 10 A/1000 V fuse for current terminal (A) (Breaking capacity 30 kA Fast-blow type: ϕ10 × 38 mm, SIBA)
Applicable standards	• Safety: EN61010 • EMC: EN61326

5.2 Electrical Characteristics

Noise suppression NMRR	• DCV: -45 dB or more (50 Hz/60 Hz)
Noise suppression CMRR	• DCV: -100 dB or more (DC/50 Hz/60 Hz, 1kΩ unbalance) • ACV: -60 dB or more (DC/50 Hz/60 Hz, 1kΩ unbalance) (However, -45 dB or more for the 1000 V range)
Response time (Auto range)	• DCV: 1.2 to 1.4 seconds (0 V → 100 V auto range operation) • ACV: 0.7 to 0.9 seconds (0 V → 100 V auto range operation) • Ω: 1.2 to 1.4 seconds (Infinity → 0Ω auto range operation)
Display update rate	Measured value: 3 times/s (after the range is fixed, excluding the resistance, continuity, electrostatic capacity, frequency) 2 times/s (resistance, continuity) 0.5 to 2 times/s (varies depending on the electrostatic capacity) 5 times/s (frequency)
Dielectric strength	Between the measurement terminal and case 7.06 kV AC sine wave (50 Hz/60 Hz, 60 seconds)
Maximum rated voltage between terminals	V terminal: 1000 V DC/AC or 10^6 V • Hz
Maximum rated current between terminals	Current terminal (A): 10 A DC/10 A AC Current terminal (μA, mA) 400 mA DC/400 mA AC
Maximum rated voltage between input terminals and ground	1000 V AC (Measurement category II) 600 V AC (Measurement category III) Anticipated transient overvoltage: 6000 V

Rated power voltage	1.5 V DC × 2 R6P manganese battery × 2 LR6 alkaline battery × 2
Maximum rated power	100 mVA (max) Power voltage 3.0 V, continuity measurement input short-circuited, backlight lit
Rated power	• 7.5 mVA +20% or less Power voltage 3.0 V, DCV measurement, backlight off • 0.05 mVA +20% or less Power voltage 3.0 V, auto power save function activated
Continuous operating time	AA manganese batteries, DCV, backlight off DT4211 (Average value measurement model): Approx. 300 hours DT4212 (True RMS measurement model): Approx. 240 hours AA alkaline batteries, DCV, backlight off DT4211 (Average value measurement model): Approx. 800 hours DT4212 (True RMS measurement model): Approx. 450 hours

5.3 Accuracy Table

Accuracy warranty period	1 year
Regulated power supply range	2.4 V ± 0.15 V or more (until B lights up)
Accuracy guarantee for temperature and humidity	23°C ± 5°C (73°F ± 9°F), 80%RH or less (non-condensating)
Temperature characteristic	Adds “Measurement accuracy × 0.1/°C” (excluding 23°C ± 5°C (73°F ± 9°F)).

- rdg. (reading or displayed value): The value currently being measured and displayed on the measuring instrument.
- dgt. (resolution): The smallest displayable unit, i.e., the input value that causes the digital display to show a “1” as the least-significant digit.

1 AC voltage

Range	Accuracy*1	Input impedance
	40 to 500 Hz	
400.0 mV*2	±1.0% rdg. ±10 dgt.	11MΩ ±2% 100 pF or less
4.000 V	±1.0% rdg. ±5 dgt.	
40.00 V	±1.0% rdg. ±5 dgt.	10MΩ +2% 100 pF or less
400.0 V		
1000 V		

- Overload protection: 1100 V DC/1100 V AC or 10^6 V • Hz (energized for 1 minute)
  Transient overvoltage: 6000 V
- Crest factor (Only the DT4212 (True RMS measurement model)): The crest factor is 2 up to 2800 counts and reduces linearly to 1.5 at 4000 counts.

*1: The accuracy is specified in 1% or more of the range.

*2: Only the manual range.

2 DC voltage

Range	Accuracy	Input impedance
400.0 mV	±0.5% rdg. ±3 dgt.	Over 100MΩ
4.000 V		11MΩ ±2%
40.00 V	±0.5% rdg. ±3 dgt.	10MΩ +2%
400.0 V		
1000 V		

- Overload protection: 1100 V DC/1100 V AC or 10^6 V • Hz (energized for 1 minute)

3 Resistance

Range	Accuracy	Measurement current	Open circuit voltage
400.0Ω	±0.5% rdg. ±3 dgt.	Approx. 140 µA	0.5 V DC or less
4.000kΩ	±0.5% rdg. ±2 dgt.		
40.00kΩ	±0.5% rdg. ±2 dgt.	Approx. 40 µA	
400.0kΩ		Approx. 4 µA	
4.000MΩ		Approx. 400 nA	
40.00MΩ	±1.5% rdg. ±3 dgt.	Approx. 40 nA	

- Overload protection: 1000 V DC/1000 V AC or 10^6 V • Hz (energized for 1 minute)
  Current under short circuit: 300 µA or less
  Current under overload: Steady state 15 mA or less, transient state 0.8 A or less
- Maximum capacity load: 10 mF
- Maximum inductive load: 10 H

4 Diode

Range	Accuracy	Measurement current	Open circuit voltage
1.000 V	±10.0% rdg.	0.5 mA	3.0 V DC or less Voltage drop due to battery consumption

- Overload protection: 1000 V DC/1000 V AC or 10^6 V • Hz (energized for 1 minute)
  Current under short circuit: 0.7 mA or less
  Current under overload: Steady state 15 mA or less, transient state 0.8 A or less

5 Continuity

Range	Accuracy	Measurement current	Open circuit voltage
400.0Ω	±1.0% rdg. ±15 dgt.	Approx. 140 µA	0.5 V DC or less

- Overload protection: 1000 V DC/1000 V AC or 10^6 V • Hz (energized for 1 minute)
  Current under short circuit: 300 µA or less
  Current under overload: Steady state 15 mA or less, transient state 0.8 A or less
- Continuity ON threshold: 90 ± 40Ω or less (buzzer)
- Response time: Open circuit or short circuit is detected for at least 0.5 ms.

6 Electrostatic capacity

Range	Accuracy	Charging current	Open circuit voltage
50.00 nF	±1.5% rdg. ±15 dgt.	Approx. 30 µA	1.5 V DC or less
500.0 nF	±2.0% rdg. ±5 dgt.		
5.000 µF	±5.0% rdg. ±5 dgt.		
50.00 µF			
100.0 µF			

- Overload protection: 1000 V DC/1000 V AC or 10^6 V • Hz (energized for 1 minute)
  Current under short circuit: 50 µA or less
  Current under overload: Steady state 15 mA or less, transient state 0.8 A or less
- Accuracy guarantee condition: After REL (zero adjustment) has been performed

7 Frequency

Range	Accuracy	Minimum sensitivity voltage
5.000 Hz	±0.1% rdg. ±3 dgt.	Square wave of 1.5 Vrms or more
50.00 Hz		
500.0 Hz		
5.000 kHz		
50.00 kHz		
500.0 kHz		
5.000 MHz	±0.1% rdg. ±3 dgt.	Square wave of 2.0 Vrms or more

- Measurement range: 1 Hz or more

8 DC (μA)

Range	Accuracy	Input impedance
400.0 μA	±1.2% rdg. ±3 dgt.	100Ω ±5%
4000 μA		

- Overload protection: 630 mA/1000 V fuse, breaking capacity 50 kA

9 AC (μA)

Range	Accuracy*1	Input impedance
400.0 μA	±1.2% rdg. ±5 dgt.	100Ω ±5%
4000 μA		

- Overload protection: 630 mA/1000 V fuse, breaking capacity 50 kA
- Crest factor (only the DT4212 (True RMS measurement model)): The crest factor is 2 up to 2800 counts and reduces linearly to 1.5 at 4000 counts.

*1: The accuracy is specified in 1% or more of the range.
Accuracy guarantee range for frequency: 40 Hz to 500 Hz (Measured values outside the accuracy guarantee range for frequency are also displayed.)

10 DC (mA)

Range	Accuracy	Input impedance
40.00 mA	±1.2% rdg. ±3 dgt.	2Ω ±40%
400.0 mA		

- Overload protection: 630 mA/1000 V fuse, breaking capacity 50 kA

11 AC (mA)

Range	Accuracy*1	Input impedance
40.00 mA	±1.2% rdg. ±5 dgt.	2Ω ±40%
400.0 mA		

- Overload protection: 630 mA/1000 V fuse, breaking capacity 50 kA
- Crest factor (only the DT4212 (True RMS measurement model)): The crest factor is 2 up to 2800 counts and reduces linearly to 1.5 at 4000 counts.

*1: The accuracy is specified in 1% or more of the range.
Accuracy guarantee range for frequency: 40 Hz to 500 Hz (Measured values outside the accuracy guarantee range for frequency are also displayed.)

12 DC (A)

Range	Accuracy	Input impedance
4.000 A	±1.2% rdg. ±3 dgt.	0.05Ω ±40%
10.00 A		

- Overload protection: 10 A/1000 V fuse, breaking capacity 30 kA

13 AC (A)

Range	Accuracy*1	Input impedance
4.000 A	±1.2% rdg. ±5 dgt.	0.05Ω ±40%
10.00 A		

- Overload protection: 10 A/1000 V fuse, breaking capacity 30 kA
- Crest factor (only the DT4212 (True RMS measurement model)): The crest factor is 2 up to 2800 counts and reduces linearly to 1.5 at 4000 counts.

*1: The accuracy is specified in 1% or more of the range.
Accuracy guarantee range for frequency: 40 Hz to 500 Hz (Measured values outside the accuracy guarantee range for frequency are also displayed.)

14 Temperature

Thermocouple type	Range	Measurement range	Accuracy*1
K	400.0°C	-55.0°C to 0.0°C (-67°F to 32°F)	±2.0% rdg. ±2°C (±(T-32)×0.02±3.6°F)
		0.0°C to 50.0°C (32°F to 122°F)	±2°C (±3.6°F)
		50.0°C to 400.0°C (122°F to 752°F)	±2.0% rdg. ±1°C (±(T-32)×0.02±1.8°F)
	700°C	400°C to 700°C (752°F to 1292°F)	±2.0% rdg. ±1°C (±(T-32)×0.02±1.8°F)

- Overload protection: 1000 V DC/1000 V AC or 10^6 V • Hz (energized for 1 minute)
  Current under overload: Steady state 15 mA or less, transient state 0.8 A or less
- The DT4910 Thermocouples (K) are used.
- The accuracy does not include the error of the DT4910 Thermocouples (K).
- Display update rate: 3 time/s

*1: In an environment where the temperature of the instrument is ±1°C and stable, the accuracy is specified.
Standard contact temperature compensation stability time: 120 minutes (When the instrument environmental temperature changes quickly from 50°C to 23°C (122°F to 73°F))
T = reading value (°F)

6 Maintenance and Service

6.1 Repair, Inspection, and Cleaning

⚠ DANGER

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

Calibrations

IMPORTANT
Periodic calibration is necessary in order to ensure that the instrument provides correct measurement results of the specified accuracy.

The calibration frequency varies depending on the status of the instrument or installation environment. We recommend that the calibration frequency is determined in accordance with the status of the instrument or installation environment and that you request that calibration be performed periodically.

Cleaning

- To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent.
- Wipe the display gently with a soft, dry cloth.

IMPORTANT
Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

Disposal

Handle and dispose of the instrument in accordance with local regulations.

6.2 Troubleshooting

- When a malfunction of the instrument is suspected, check the information in “Before sending the instrument for repair” and then, if necessary, contact your authorized Hioki distributor or reseller.
- When sending the instrument for repair, remove the batteries and pack it carefully to prevent damage during transportation. Include cushioning material so the instrument cannot move within the package. Be sure to include details of the problem. Hioki cannot be responsible for damage that occurs during transportation.

Before sending the instrument for repair

Symptom	Check and/or remedy
Nothing appears in the display.	Check that the batteries are not exhausted. Replace with new batteries. (p. 24)
Or the display disappears after a short time.	Check that the auto power save function has not been activated. Check the setting of the auto power save function. (p. 49)

Symptom	Check and/or remedy
The measurement value does not appear. **Even after the measurement, 0 (zero) still appears.**	If the measured current value does not appear, check that the fuse is not blown. Check method: “Check that the fuse is not broken.” (p. 32) If the fuse is blown, replace it with the specified fuse. (p. 67)
Even after short circuit of the probe, the measured value does not appear. **Zero adjustment is not possible.**	If the measured current value does not appear, check that the fuse holder is not deformed. When removing the fuse, the holder is deformed if excessive force is applied. Pinch it with needle-nose pliers and restore the shape of the fuse holder.
	Check that the test lead is not broken. Perform the continuity check to confirm the continuity of the test leads. (p. 30) If the test lead is broken, replace the lead.
	• Check that the test leads have been inserted at the ends. • Check that the measurement method is correct. If no problems have been found, the instrument may be malfunctioning. Send the instrument for repair.
The display does not stabilize and the value fluctuates; it is difficult to read the value.	Check that the input signal is within the input range for the instrument.

Other inquiries

Question	Solution
Would like to perform zero adjustment.	Using the relative value display function, zero adjustment can be performed. (p. 48)

Question	Solution
Would like to replace the fuse. **Would like to know how to obtain the fuse.**	The fuse can be purchased via authorized Hioki distributor or reseller.
Can rechargeable batteries be used?	Rechargeable batteries can be used. However, the discharge characteristic of these batteries is different from that of alkaline batteries. Be aware that the remaining battery power display does not function properly.

6.3 Replacing Fuses

If a fuse is blown, replace it with a new one as follows.

For details on how to check that the fuse is blown, see “3 Check that the fuse is not broken.” (p. 32).

⚠ WARNING

- **To avoid electric shock, disconnect the test leads from the object to be measured before replacing the fuse.**
- **Replace the fuse only with one of the specified type, characteristics, rated current, and rated voltage. Do not use fuses other than those specified (especially, do not use a fuse with higher-rated current) or do not short circuit and use the fuse holder. Doing so may damage the instrument and result in personal injury.**

Specified fuses

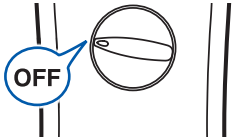
	Rating	Specifications
For μA/mA terminal	630 mA/ 1000 V	Manufacturer: SIBA Meltdown characteristics: Fast-blow type Breaking capacity: 50 kA Size: ϕ6.3 mm × 32 mm
For A terminal	10 A/ 1000 V	Manufacturer: SIBA Meltdown characteristics: Fast-blow type Breaking capacity: 30 kA Size: ϕ10 mm × 38 mm

The fuses can be purchased via authorized Hioki distributor or reseller.

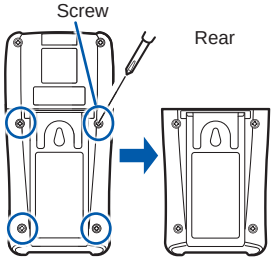
When removing the fuse, do not apply excessive force on the fuse holder. If the fuse holder is deformed, the connection becomes poor and the instrument cannot measure the current.

⚠CAUTION

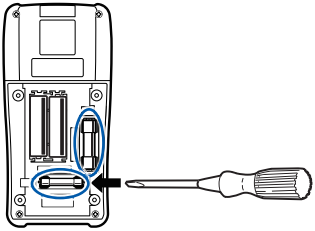
When replacing the fuse, do not allow foreign matter to enter the instrument. It may cause a malfunction. Do not remove the fuse using the tip of test lead L9206 supplied with the instrument. The tip of the test lead may bend.



1. **Remove the test leads from the instrument.**
2. **Set the rotary switch to OFF.**



3. **Remove the holster.**
4. **Using a Phillips screwdriver, remove the screws (4 locations) from the battery cover.**
5. **Remove the battery cover.**



6. **Replace the fuse.**
7. **Reattach the battery cover.**
8. **Secure the cover with the screw.**
9. **Reattach the holster.**

Appendix

Appx. 1 RMS and Average

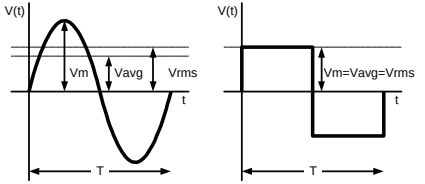
Difference between the RMS and Average

When converting AC to RMS, 2 methods are available, “True RMS method (True RMS indication)” and “Average method (Average rectifying RMS indication)”.
In the case of the sine wave where no skew is included, the same values are indicated in both methods. However, if the waveform is skewed, a difference occurs between the 2 methods.

The DT4211 (Average value measurement model) uses the Average method, and the DT4212 (True RMS measurement model) uses the True RMS method.

In the true RMS method, the high frequency component is also included and displayed.
In the average method, the input waveform is handled as a sine wave where no skew is included (only single frequency). The average of the AC signal is obtained, converted to the RMS, and then displayed. If the waveform is skewed, a greater measurement error occurs.

Measurement example	True RMS	Average rectifying
100 V sine wave	100 V	100 V
100 V square wave	100 V	111 V



Sine wave Square wave

Vm: Maximum value, Vavg: Average value, Vrms: RMS, T: Time period

Warranty Certificate

Model	Serial No.	Warranty period Three (3) years from date of purchase (___ / ___)

This product passed a rigorous inspection process at Hioki before being shipped.

In the unlikely event that you experience an issue during use, please contact the distributor from which you purchased the product, which will be repaired free of charge subject to the provisions of this Warranty Certificate. This warranty is valid for a period of three (3) years from the date of purchase. If the date of purchase is unknown, the warranty is considered valid for a period of three (3) years from the product's date of manufacture. Please present this Warranty Certificate when contacting the distributor. Accuracy is guaranteed for the duration of the separately indicated guaranteed accuracy period.

1. Malfunctions occurring during the warranty period under conditions of normal use in conformity with the Instruction Manual, product labeling (including stamped markings), and other precautionary information will be repaired free of charge, up to the original purchase price. Hioki reserves the right to decline to offer repair, calibration, and other services for reasons that include, but are not limited to, passage of time since the product's manufacture, discontinuation of production of parts, or unforeseen circumstances.
2. Malfunctions that are determined by Hioki to have occurred under one or more of the following conditions are considered to be outside the scope of warranty coverage, even if the event in question occurs during the warranty period:
   a. Damage to objects under measurement or other secondary or tertiary damage caused by use of the product or its measurement results
   b. Malfunctions caused by improper handling or use of the product in a manner that does not conform with the provisions of the Instruction Manual
   c. Malfunctions or damage caused by repair, adjustment, or modification of the product by a company, organization, or individual not approved by Hioki
   d. Consumption of product parts, including as described in the Instruction Manual
   e. Malfunctions or damage caused by transport, dropping, or other handling of the product after purchase
   f. Changes in the product's appearance (scratches on its enclosure, etc.)
   g. Malfunctions or damage caused by fire, wind or flood damage, earthquakes, lightning, power supply anomalies (including voltage, frequency, etc.), war or civil disturbances, radioactive contamination, or other acts of God
   h. Damage caused by connecting the product to a network
   i. Failure to present this Warranty Certificate
   j. Failure to notify Hioki in advance if used in special embedded applications (space equipment, aviation equipment, nuclear power equipment, life-critical medical equipment or vehicle control equipment, etc.)
   k. Other malfunctions for which Hioki is not deemed to be responsible

*Requests
- Hioki is not able to reissue this Warranty Certificate, so please store it carefully.
- Please fill in the model, serial number, and date of purchase on this form.

13-09

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