

kaise

DIGITAL MULTIMETER

Instruction Manual

KU-1199

KAISE CORPORATION

FOR SAFETY MEASUREMENTS!!

To prevent an electrical shock hazard to the operator and/or damage to the instruments, read this instruction manual carefully before using the instrument. **WARNINGS** with the symbol ⚠ on the instrument and this instruction manual are highly important.

	The symbol listed in IEC 61010-1 and ISO 3864 means "Caution" (refer to instruction manual).
WARNING	The symbol in this manual advises the user of an electrical shock hazard that could result in serious injury or even death.
CAUTION	The symbol in this manual advises the user of an electrical shock hazard that could cause injury or material damages.

INTRODUCTION

Thank you for purchasing "DIGITAL MULTIMETER KU-1199". To obtain the maximum performance of this instrument, read this Instruction Manual carefully, and take safe measurement.

1. UNPACKING AND INSPECTIONS

Confirm if the following items are contained in the package in good condition. If there is any damage or missing items, ask your local dealer for replacement.

1. Digital Multimeter ————— 1 pce.
2. 1005 Carrying Case ————— 1 pce.
3. 1.5V LR44 Batteries ————— 2 pcs. (Installed)
4. Instruction Manual ————— 1 pce.

2. SPECIFICATIONS

2-1. GENERAL SPECIFICATIONS

- 1. DISPLAY (LCD) :**
 - a. Numerical Display : 4000 count, 19mm high
 - b. Units and Symbols : m, V, k, M, Ω, **AUTO**, \rightarrow , \leftarrow , \sim , \equiv , \blacksquare , \ominus , and decimal point
- 2. OPERATING PRINCIPLE :** Σ Δ conversion
- 3. OVERLOAD INDICATION :**
 - DC Voltage : Buzzer at 1000V, OL display at 1100V or more
 - AC Voltage : Buzzer at 750V, OL display at 780V or more
 - Resistance : OL display at 40.40MΩ or more
 - Diode Test : OL display at 2.000V or more
 - Continuity Test : OL display at 404.0Ω or more
- 4. RANGE SELECTION :** Auto Ranging
- 5. POLARITY :** Auto polarity ("—" sign when minus)
- 6. OPERATING POWER SUPPLY VOLTAGE :** Between 2.4V to 3.4V approx.

- 7. BATTERY WARNING :** "■" indication at approx. 2.4V or less
- 8. SAMPLING RATE :** 3 times/second
- 9. AUTO POWER OFF :** Power turns off automatically after approx. 10 minutes (cancelable)
- 10. OPERATING TEMPERATURE & HUMIDITY :** 0°C to 40°C, less than 80%RH in non-condensing
- 11. STORAGE TEMPERATURE & HUMIDITY :** -20°C to 60°C, less than 70%RH in non-condensing
- 12. TEMPERATURE COEFFICIENT :** Accuracy at 23°C $\pm 5^\circ\text{C} \times 0.1/^\circ\text{C}$
- 13. POWER SUPPLY :** 1.5V LR44 x 2
- 14. POWER CONSUMPTION :** approx. 2.15mA (when power-on)
approx. 7.00mA (when measuring)
- 15. CONTINUOUS OPERATING TIME :** approx. 20 hours (when power-on)
approx. 6 hours (when measuring)
- 16. DIELECTRIC STRENGTH :** 3.7kV for 1 minute between input terminal and case
- 17. SAFETY LEVEL :** CE marking approved (IEC-61010-2-030, CAT II 500V and EMC Test passed.)
- 18. DIMENSIONS & WEIGHT :** 112(H)×56(W)×11(D)mm, Approx. 72g
- 19. ACCESSORIES :** 1005 Carrying Case, 1.5V LR44 Batteries x 2, Instruction Manual
- 20. OPTIONAL ACCESSORIES :** 793 Coil-Type Contact Pin, 940 Alligator Clips, 944 Test Pin, 946 Battery Clip

2-2. MEASUREMENT SPECIFICATION

(23°C $\pm 5^\circ\text{C}$, <80%RH in non-condensing)

1. DC Voltage (\equiv mV, \equiv V)

Range	Resolution	Accuracy	Input Impedance	Maximum Input
400.0mV	0.1mV	$\pm 0.5\% \text{rdg} \pm 3 \text{dgt}$	$\approx 5 \text{M}\Omega$	500V
4.000V	1mV			
40.00V	10mV			
400.0V	100mV	$\pm 0.8\% \text{rdg} \pm 3 \text{dgt}$		
500V	1V			

Range selection : Auto range

2. AC Voltage (\sim mV, \sim V)

Range	Resolution	Accuracy	Input Impedance	Maximum Input
400.0mV	0.1mV	$\pm 1.0\% \text{rdg} \pm 8 \text{dgt} (100 \text{mV} \sim)$	$\approx 5 \text{M}\Omega$	500V
4.000V	1mV	$\pm 0.8\% \text{rdg} \pm 3 \text{dgt}$		
40.00V	10mV			
400.0V	100mV	$\pm 1.2\% \text{rdg} \pm 3 \text{dgt}$		
500V	1V			

Range selection : Auto Range, Frequency Characteristics : 50Hz to 400Hz
Approx. 8dgt may display when shorting test prod tips.

3. Resistance (Ω)

Range	Resolution	Accuracy	Open Circuit Voltage
400.0Ω	0.1Ω	$\pm 1.0\% \text{rdg} \pm 5 \text{dgt}$	$\approx 0.25 \text{V}$
4.000kΩ	1Ω	$\pm 1.0\% \text{rdg} \pm 3 \text{dgt}$	
40.00kΩ	10Ω		
400.0kΩ	100Ω	$\pm 2.0\% \text{rdg} \pm 3 \text{dgt}$	
4.000MΩ	1kΩ		
40.00MΩ	10kΩ		

Overload Protection : DC 500V or AC 500V rms for 1 minute.
Approx. 5dgt may display when shorting test prod tips.

4. Diode Test (\rightarrow)

Range	Accuracy	Open Circuit Voltage	Test Current
0 to 2.000V	$\pm 5\% \text{rdg} \pm 3 \text{dgt}$	$\approx 2.9 \text{V}$	$1 \pm 0.6 \text{mA}$

Overload Protection : DC 500V or AC 500V rms for 1 minute.

5. Continuity Test (\rightarrow)

Range	Buzzer Sound	Response Time	Open Circuit Voltage
400.0Ω	12Ω to 70Ω	$\approx 3 \text{ sec.}$	$\approx 0.43 \text{V}$

Overload Protection : DC 500V or AC 500V rms for 1 minute.

3. SAFETY PRECAUTIONS

3-1. WARNINGS

Correct knowledge of electric measurements is essential to avoid unexpected danger such as operator's injury or damage to the instrument. Read carefully and observe the following precautions for safety measurements.

⚠ WARNING

Checks of Body and Test Lead

Before measurement, confirm the body of this instrument and handle insulators of the Test Lead have no cracks or any other damages. Dust, grease and moisture must be removed.

High Power Line Measurements is Prohibited

Do not measure High Power Line (High Energy Circuits) such as Distribution Transformers, Bus Bars and Large Motors. High Power Line sometimes includes High Surge Voltage that could cause explosive short in the instrument and could result in shock hazard. Generally, shock hazard could occur when the current between the circuit, that involves more than 30V rms or 42.4V DC or peak, and ground goes up to 0.5mA or more.

Warning for High Voltage Measurements

Even for Low Energy Circuits of electric/electronic appliances, such as heating elements, small motors, line cords and plugs, High Voltage Measurements are very dangerous. Do not touch any part of the circuit.

Dangerous Voltage Measurement Procedure

For dangerous voltage measurement, strictly observe the warnings below.

1. Before measurement, turn off power to the circuit to be measured.
2. Turn on the instrument with Rotary Switch.
3. Attach black and red alligator clips (option) to test prods.
4. Confirm that the power of the circuit to be measured is OFF. Then, connect Black Alligator Clip to — (earth) side and Red Alligator Clip to + (positive) side of the circuit to be measured.
5. Do not hold Tester in your hands. Keep safety distance from power source or circuit to be measured not to touch the dangerous voltage.
6. Turn on the circuit to be measured and read the voltage on LCD.
7. Turn off the circuit to be measured, then detach alligator clips (test prods).

In case of live-line measurement, strictly observe the warnings below.

1. Wear the insulating gloves.
2. Do not hold Tester in your hands.
3. Turn on the instrument with Rotary Switch.
4. Attach black alligator clip (option) and connect to — (earth) side of the circuit.
5. Keep safety distance from power source or circuit to be measured not to touch the dangerous voltage.
6. Hold Red Test Prod with one hand and connect it to + (positive) side of the circuit to be measured.
7. Read the measurement value on LCD.
8. Turn off the circuit to be measured, then detach alligator clips (test prods).

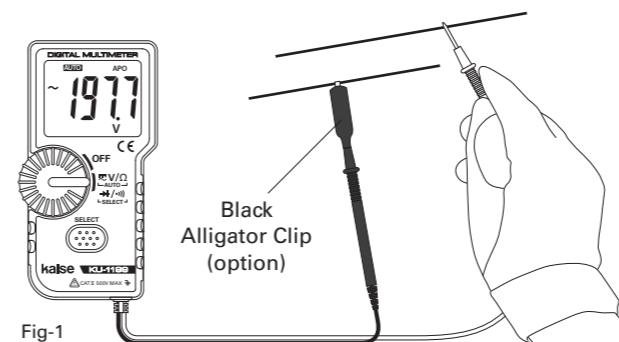


Fig-1

3-2. PREVENTION OF FAILURE

⚠ WARNING

Correct Selection of SELECT Key

Make sure that the proper function is selected with **SELECT Key**. Do not measure voltage in other measurement functions.

Maximum Input Observance

Do not measure anything that might exceed the specified maximum input values.

⚠ WARNING

Test Prods Detachment

Detach Test Prods from measuring circuit before changing measurement functions or opening Rear Case for battery replacement.

3-3. GENERAL WARNINGS AND CAUTIONS

⚠ WARNING

1. Children and the persons who do not have enough knowledge about electric measurements must not use this instrument.
2. Do not measure the electricity naked or barefooted to protect yourself from electrical shock hazard.
3. Do not attempt to disassemble or modify the instrument.
4. Be careful not to get hurt with the sharp test prod pins.

⚠ CAUTION

1. Away the instrument from hot and humid conditions like in the car. Do not apply hard mechanical shock or vibration.
2. Do not polish the case or attempt to clean it with any cleaning fluid like gasoline or benzene. If necessary, use silicon oil or antistatic fluid.
3. Remove the batteries when the instrument is out of use for a long time. The exhausted batteries might leak electrolyte and corrode the inside.
4. Do not hit, thrust and make scratch on the LCD display part.

4. NAME ILLUSTRATION

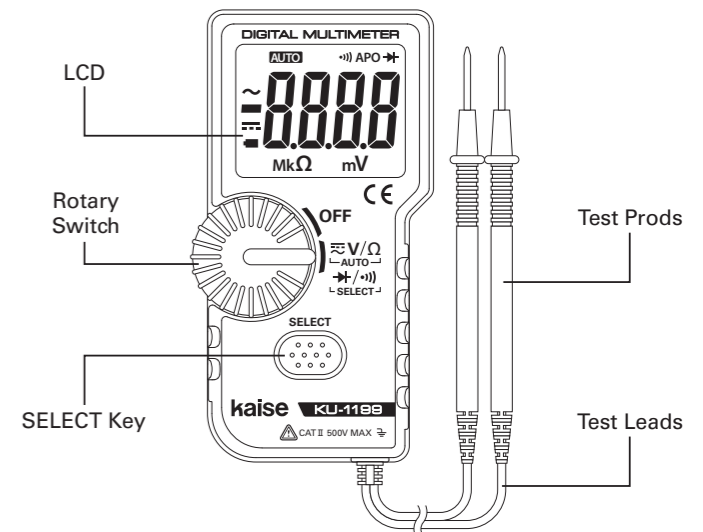
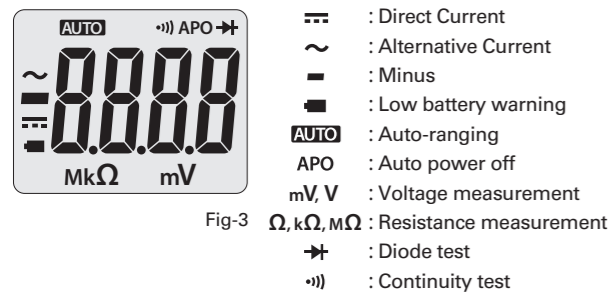


Fig-2

4-1. LCD

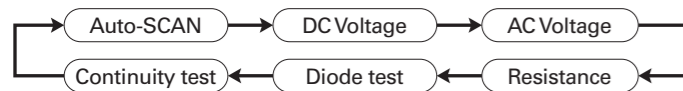


4-2. Rotary Switch

The switch to turn on the instrument. After finishing the measurement, turn it to "OFF".

4-3. SELECT Key

Display should change as following by pressing **SELECT Key**.



4-4. Test Prods

Connect red and black test prods to the circuit to be measured. Generally, Black Test Prod is connected to $-$ (earth) side, and Red Test Prod is connected to $+$ (positive) side.

4-5. Auto-SCAN Measurement

Aut detection and measurement function for DC/AC Voltage and Resistance. See "5-2" for details.

4-6. Auto Power Off

Power turns off automatically after approx. 10 minutes of last operation.

NOTE : Pressing SELECT Key under Auto Power Off condition makes the instrument turn on. Make sure to return the Rotary Switch to "OFF" when storing it in the carrying case.

To cancel it : Turn on the instrument holding down **SELECT Key**. Auto power off is deactivated. ("APO" disappeared from LCD).

5. MEASUREMENT PROCEDURES

5-1. PREPARATION FOR USE

1. INSTRUCTION MANUAL

Read Instruction Manual carefully to understand the specification and functions correctly. "3. SAFETY PRECAUTIONS" is very important for safety measurement.

2. BATTERY

Two 1.5V LR44 batteries are installed in this instrument. When batteries are exhausted, " ■ " lights up on LCD. For the replacement, refer to "6-1. BATTERY REPLACEMENT".

NOTE : Supplied batteries are for testing purpose that may run out earlier than the new ones.

3. DISPLAY FILM

Tear off the Display Film on LCD display when using this instrument for the first time.

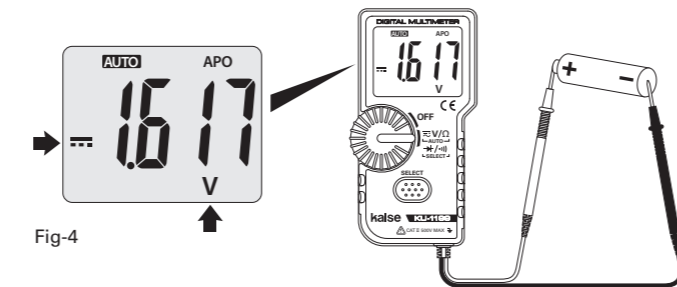
5-2. Auto-SCAN Measurement for DC / AC VOLTAGE ($\text{DC V} / \sim \text{V}$), RESISTANCE (Ω)

WARNING

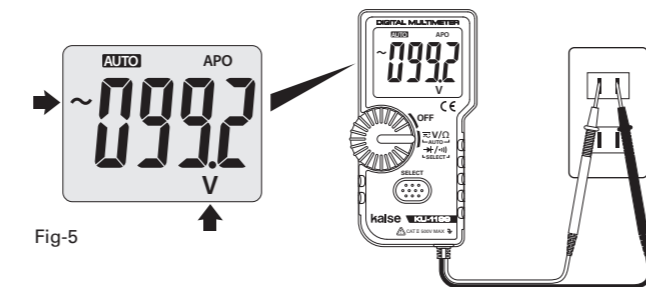
- Do not measure High Power Line or high power circuit.
- Do not measure any voltage that might exceed maximum input value (DC 500V / AC 500V rms).
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

- Turn on the instrument with Rotary Switch. "SCAN" is displayed.
- Connect Black Test Prod to the $-$ (earth) side of the circuit to be measured and Red Test Prod to the $+$ (positive) side.
- The instrument automatically detects the items to be measured (DCV, ACV or Ω as shown below) and start the measurement. Read the test result on LCD.

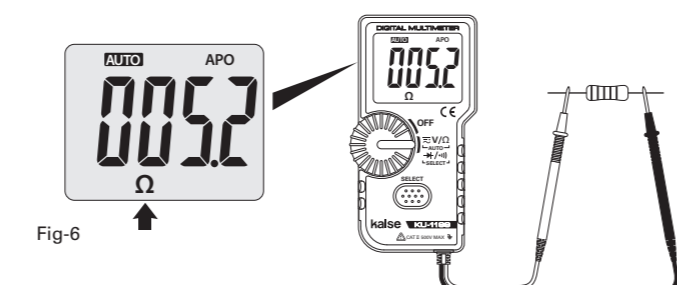
When detecting DC Voltage (Example : Battery)
" DC " and "V" are displayed.



When detecting AC Voltage (Example : Wall outlet)
" \sim " and "V" are displayed.



When detecting resistance (Example : 5 Ω resistor)
" Ω " is displayed.



- Set **Rotary Switch** to "OFF" for turning off the instrument.

Auto-SCAN error??

If an unexpected item is detected, select the proper one manually with the following steps. (e.g. Ω is displayed in DC Voltage assumed circuit.)

- Detach test prods from the measuring item.
- Make sure "SCAN" is displayed on LCD.
- Select the proper measurement item with **SELECT Key**.

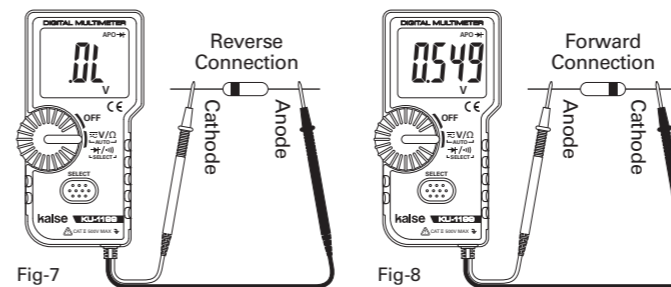
5-3. DIODE TEST (\rightarrow)

WARNING

- Do not measure voltage in " \rightarrow " position. This will cause electrical shock hazard to the operator and/or serious damage to the instrument.
- If the diode is connected in a circuit, turn off the power to the circuit being measured and discharge the all capacitors.
- Read "3. SAFETY PRECAUTIONS" carefully before measurement.

- Turn on the instrument with Rotary Switch. "SCAN" is displayed.
- Press **SELECT Key** four times. " \rightarrow " is displayed on LCD.
- If the diode is connected in a circuit, turn off the circuit and discharge the all capacitors. Disconnect one side of the diode.
- Connect black test prod to Anode side and red test prod to Cathode side of the diode (Reverse connection). Confirm "OL" is displayed on LCD (see Fig-7).
- Connect test prods to the opposite side of "4" (Forward Connection). Test results are good if the following voltage values are displayed on LCD (see Fig-8).

Silicon diodes : 0.4V to 0.7V
Germanium diodes : 0.1V to 0.4V



- Set **Rotary Switch** to "OFF" for turning off the instrument.

5-4. CONTINUITY TEST (\rightarrow)

WARNING

- Do not measure voltage in " \rightarrow " position. This will cause electrical shock hazard to the operator and/or serious damage to the instrument.
- When measuring in-circuit continuity, turn off the power to the circuit being measured and discharge the all capacitors.
- Read "3. SAFETY PRECAUTIONS" carefully before measurement.

- Turn on the instrument with Rotary Switch. "SCAN" is displayed.
- Press **SELECT Key** five times. " \rightarrow " is displayed on LCD.
- Connect test prods to both side of the circuit to be measured.
- Buzzer sounds when the testing circuit has good continuity.
- Set **Rotary Switch** to "OFF" for turning off the instrument.

6. MAINTENANCE

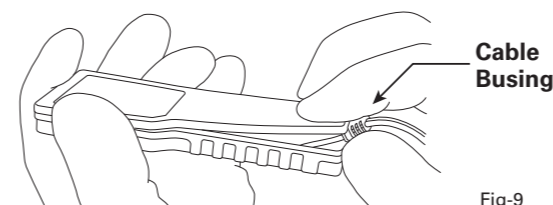
6-1. BATTERY REPLACEMENT

WARNING

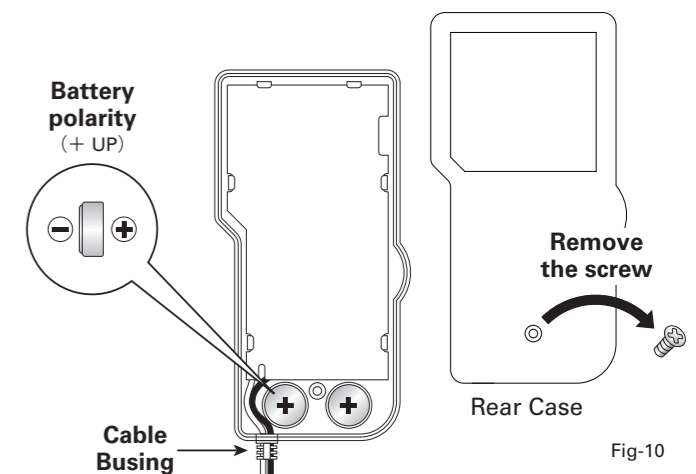
- To avoid electrical shock, make sure to finish the measurement before replacing the batteries.
- Detach test prods from circuit and set Rotary Switch to "OFF".

Replace the batteries when " ■ " symbol appears on LCD.

- Set **Rotary Switch** to "OFF".
- Loosen the screw of rear case.
Push up from the cable bushing part and open the case. (see Fig-9)



- Remove the exhausted batteries and insert 2 pcs of new 1.5V LR44 batteries in the correct polarity. (see Fig-10)
- Restore the cable bushing properly. Close the rear case and tighten the screw.



6-2. PERIODICAL CHECK AND CALIBRATION

Periodical check and calibration is necessary to make safety measurements and to maintain the specified accuracy. The recommended check and calibration term is once a year and after the repair service. This service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer.

6-3. REPAIR

Repair service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer. Pack the instrument securely with your name, address, telephone number and problem details, and ship prepaid to your local dealer.

Check the following items before asking repair service.

- Check the battery connection, polarity, and capacity.
- Confirm if the over input, exceeding the specified range value, is not applied.
- Confirm that measured accuracy is adopted in the operating environment.
- Confirm that the body of this instrument have no cracks or any other damages.

WARRANTY

KU-1199 are warranted in its entirety against any defects of material or workmanship under normal use and service within a period of one year from the date of purchase of the original purchaser. Warranty service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer. Their obligation under this warranty is limited to repairing or replacing KU-1199 returned intact or in warrantable defect with proof of purchase and transport charges prepaid. KAISE AUTHORIZED DEALER and the manufacturer, KAISE CORPORATION, shall not be liable for any consequential damages, loss or otherwise. The foregoing warranty is exclusive and in lieu of all other warranties including any warranty of merchantability, whether expressed or implied.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside of KAISE AUTHORIZED SERVICE AGENCY, nor which have been subject to misuse, negligence, accident, incorrect repair by users, or any installation or use not in accordance with instructions provided by the manufacturer.

KAISE AUTHORIZED DEALER



KAISE CORPORATION

422 Hayashinogo, Ueda City, Nagano Pref., 386-0156 Japan
TEL : +81-268-35-1601 / FAX : +81-268-35-1603
E-mail : sales@kaise.com http://www.kaise.com

Product specifications and appearance are subject to change without notice due to continual improvements.