

2-2. MEASUREMENT SPECIFICATION

Measurement Items	Measurement Range	Tolerance
DC Voltage (DC.V)	0.3V/3V/12V/30V/120V/300V/1200V	±3% full scale
AC Voltage (AC.V)	12V/30V/120V/300V/1200V	±4% full scale
DC Current (DC.mA/A)	60 μA/3mA/30mA/600mA/12A ※1	±3% full scale
Resistance (Ω)	5kΩ/500kΩ/5MΩ (×1/×100/×1k)	±3% f.s. length
Temperature (°C) ※2	-50°C to +250°C	±3% f.s. length
Continuity (•••)	Buzzer at approx. 30Ω or less	—

Internal Resistance : DC Voltage 20kΩ/V, AC Voltage 10kΩ/V

※NOTE 1 : Continuous measurement in 12A DC range is restricted **up to 1 minute. More than 1 minute interval** is necessary for the next measurement.

※NOTE 2 : Temperature measurement requires the optional 810-02 temperature probe.

3. SAFETY PRECAUTIONS

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

3-1. WARNINGS

⚠ WARNING 1. Checks of the Instrument and Test Leads

Before measurement, check if there are no damage to the instrument and the test leads. Dust, grease and moisture must be removed.

⚠ WARNING 2. Prohibition of High Power Line Measurement

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 AC or 42.4V DC, and ground goes up to 0.5mA or more.

⚠ WARNING 3. Warning for High Voltage Measurement

Even for Low Power Circuits of electric/electronic appliances, such as heating elements, small motors, line cords and plugs, High Voltage Measurements are very dangerous. To avoid electric shock hazard, pay careful attention not to touch any part of the circuit.

⚠ WARNING 4. Warning for Dangerous Voltage Measurement

For dangerous high voltage measurement, strictly observe the warnings below (see Fig. 1).

- Do not hold the instrument in your hands.
- Keep safety distance from the circuit to be measured and the test leads not to touch the dangerous voltage.
- Attach black and red alligator clips to the test lead pins.
- Shut down the power of the circuit when connecting test leads to the circuit to be measured.
- After finishing the measurement, shut down the power of the circuit again and discharge the all capacitors. Then, detach alligator clips (test leads) from the circuit.

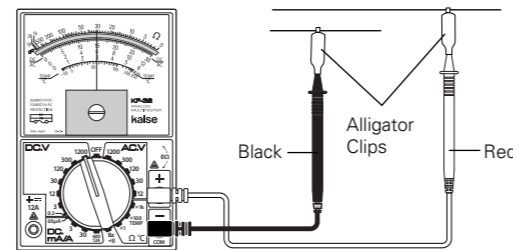


Fig. 1

In case of live-line measurement, strictly observe the warnings below : (see Fig. 2)

- Do not hold the instrument in your hands.
- Keep safety distance from the circuit to be measured not to touch the dangerous voltage.
- Black test lead : Attach black alligator clip and connect to - (earth) side of the circuit.
- Red test lead : Connect to + (positive) side of the circuit.

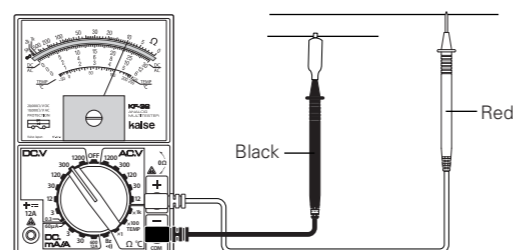


Fig. 2

⚠ WARNING 5. Warning for 12A DC Measurement

1. Set **RANGE** Switch to 600/12A position and insert red test lead to 12A terminal. (Insert black test lead to -COM terminal.)
2. 12A DC range is not fuse-protected. Do not measure any current that might exceed 12A to avoid electric shock hazard and serious damage to the instrument.
3. Do not measure any voltage in 12A DC range. Do not measure +/− terminals of car battery directly (fig. 3). Do not measure household wall socket (fig. 4).

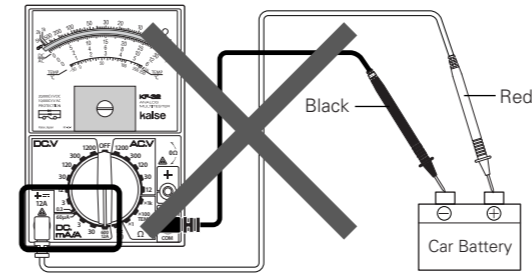


Fig. 3

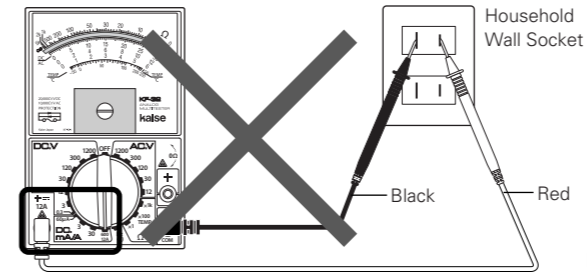


Fig. 4

⚠ WARNING 6. Correct Selection of Range Switch

Always confirm that **RANGE** Switch is set to the correct position. Do not measure any voltage except in the DC.V and AC.V ranges.

⚠ WARNING 7. Maximum Input Observance

Do not measure any elements that might exceed the specified maximum input values of each measurement ranges.

⚠ WARNING 8. Test Lead Detachment

Detach test leads from the measuring circuit before changing **RANGE** Switch to another position or removing rear case for battery or fuse replacement.

3-2. GENERAL WARNINGS AND CAUTIONS

⚠ WARNING 1. Children and the persons who do not have enough knowledge about electric measurements must not use this instrument.

⚠ WARNING 2. Do not measure the electricity in naked of barefooted to protect yourself from electrical shock hazard.

⚠ WARNING 3. Be careful not to get hurt with the sharp test lead pins.

⚠ CAUTION 1. Away the instrument from hot and humid conditions like in the car. Do not apply hard mechanical shock or vibration.

⚠ CAUTION 2. Do not polish the case or attempt to clean it with any cleaning fluid like gasoline or benzine. If necessary, use silicon oil or antistatic fluid.

⚠ CAUTION 3. Remove the battery when the instrument is out of use for a long time. The exhausted battery might leak electrolyte and corrode the inside.

4. NAME ILLUSTRATION

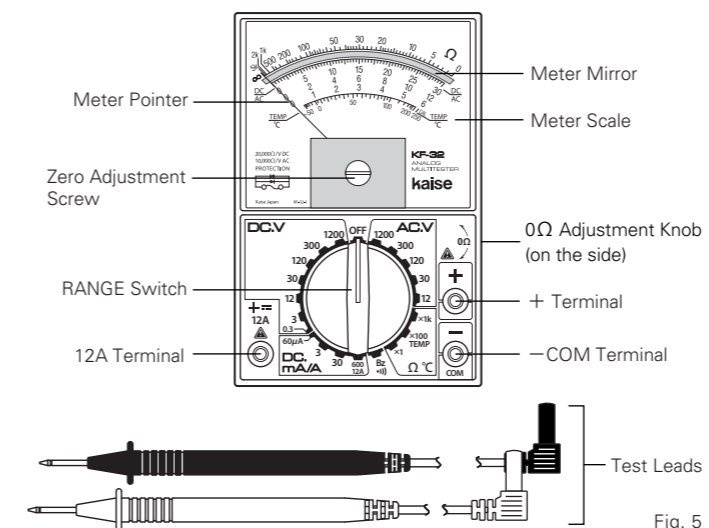


Fig. 5

4-1. RANGE Switch

Set **RANGE** Switch to an appropriate measurement range. When measuring uncertain voltage or current, firstly set the switch to the highest range enabling to measure an approximate value. Then, change the switch to an appropriate range.

Notes for the appropriate range selection

Voltage and Current : Place the pointer right side of the meter scale (between the center and the maximum scale).

Resistance : Place the pointer around the center of Ω scale.

⚠ WARNING

- Before starting the measurement, confirm that the **RANGE** Switch is set to the correct position. Do not measure any voltage except in the DC.V and AC.V ranges to avoid electric shock hazard and serious damage to the instrument.
- To avoid electric shock hazard or serious damage to the instrument, detach test leads from the measuring circuit before changing **RANGE** Switch to another position.

4-2. Meter Scale (How to read)

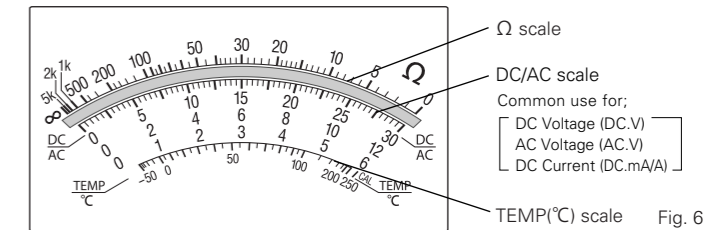


Fig. 6

1. DC/AC Scale : AC/DC Voltage, DC Current (V, μA, mA, A)

Select appropriate scale from "0 - 6", "0 - 12", or "0 - 30" according to the selected measurement range applying the certain multiple.

- Examples : 0.3V DC range : Read "0 - 30" scale multiplying by $\frac{1}{100}$.
- 120V DC range : Read "0 - 12" scale multiplying by 10.
- 60 μA DC range : Read "0 - 6" scale multiplying by 10.
- 600mA DC range : Read "0 - 6" scale multiplying by 100.

2. Ω Scale : Resistance (Ω)

Multiply the scale value by the measurement range value.

- Examples : × 1 range : Read the scale value directly.
- × 100 range : Multiply the scale value by 100.
- × 1k range : Multiply the scale value by 1,000.

3. TEMP (°C) Scale : Temperature (°C)

Read the scale value directly.

4-3. Meter Mirror (How to see the pointer)

The mirror to help the correct reading avoiding the reading error. Read the meter scale from the position that the meter pointer and its image in the mirror overlap each other. This position is directly above the meter pointer. Meter scale must be read viewing the pointer from directly above, but the clearance between the pointer and the meter scale often causes reading error if the point of view is moved off to the side.

4-4. Zero Adjustment Screw

Use to take zero adjustment in Voltage and Current measurements. Check if the meter points to "0" line on the left side of DC/AC scale before starting the measurement. If it is not on the line, turn Zero Adjustment Screw until the meter points to "0". This adjustment is necessary for accurate reading.

4-5. 0Ω Adjustment Knob

Use to take 0Ω adjustment in Resistance and Temperature measurements. Refer to "5-5. Resistance Measurement (Ω)" and "5-6. Temperature Measurement (°C)" for details.

4-6. Input Terminals • Test Leads

Insert black test lead to -COM terminal, and insert red test lead to + or 12A terminal. **NOTE :** Insert red test lead to 12A terminal for 12A DC measurement. For the other measurements, connect it to + terminal.

5. MEASUREMENT PROCEDURES

5-1. PREPARATION FOR USE

1. INSTRUCTION MANUAL

Read INSTRUCTION MANUAL carefully to understand the specification and functions properly. "3. SAFETY PRECAUTIONS" is very important for safety measurement.

2. BATTERY

Before starting the measurement, insert 1 pce of 1.5V R6P battery in reference to "6-1. BATTERY AND FUSE REPLACEMENT". Replace it in the same way when it is exhausted.

3. FUSE

Current (except for 12A DC range), resistance and continuity test ranges are protected by 0.75A/250V fuse. For replacement, see "6-1. BATTERY AND FUSE REPLACEMENT".

4. NOTES FOR THE MEASUREMENT

For accurate measurement, pay attention to the following points.

- Take the meter zero-adjustment.
- Select an appropriate range in reference to "4-1. Range Switch".
- To avoid reading error, read the meter scale from directly above the meter pointer where the pointer and its image in the mirror overlap each other. (see "4-3. Meter Mirror")
- Do not measure in the strong magnetic field or on the iron plate to prevent noise affect to the meter reading or meter sensitivity.

5-2. DC VOLTAGE MEASUREMENT (DC.V)

⚠ WARNING

- Do not measure high power line or high power circuit.
- Do not measure any voltage that might exceed the specified maximum input values of each measurement ranges.
- Before starting the measurement, check if the **RANGE** Switch is set to the correct position.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

1. Insert black test lead to —COM terminal, and insert red test lead to + terminal.
2. Set **RANGE** Switch to a necessary measurement range in DC.V.

NOTE : When measuring uncertain voltage, firstly set **RANGE** switch to the highest range enabling to measure an approximate value. Then, change the switch to an appropriate range. Detach test leads from the measuring circuit before changing **RANGE** Switch.

3. Connect black test lead to — (earth) side of the circuit being measured and connect red test lead to + (positive) side.

NOTE : Connect the instrument **IN PARALLEL** to the circuit.

NOTE : Use alligator clips for dangerous voltage measurement.

4. Read the measurement value on DC/AC scale in reference to "4-2. Meter Scale".
5. After finishing the measurement, set **RANGE** Switch to "OFF".

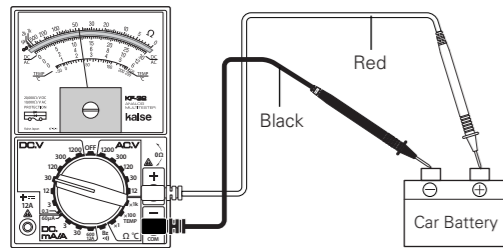


Fig. 7

5-3. AC VOLTAGE MEASUREMENT (AC.V)

⚠ WARNING

- Do not measure high power line or high power circuit.
- Do not measure any voltage that might exceed the specified maximum input values of each measurement ranges.
- Before starting the measurement, check if the **RANGE** Switch is set to the correct position.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

1. Insert black test lead to —COM terminal, and insert red test lead to + terminal.
2. Set **RANGE** Switch to a necessary measurement range in AC.V.

NOTE : When measuring uncertain voltage, firstly set **RANGE** switch to the highest range enabling to measure an approximate value. Then, change the switch to an appropriate range. Detach test leads from the measuring circuit before changing **RANGE** Switch.

3. Connect black test lead to — (earth) side of the circuit being measured and connect red test lead to + (positive) side.

NOTE : Connect the instrument **IN PARALLEL** to the circuit.

NOTE : Use alligator clips for dangerous voltage measurement.

4. Read the measurement value on DC/AC scale in reference to "4-2. Meter Scale".
5. After finishing the measurement, set **RANGE** Switch to "OFF".

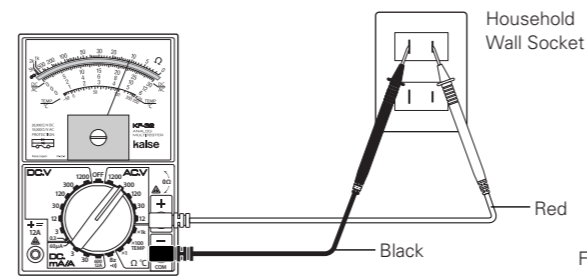


Fig. 8

5-4. DC CURRENT MEASUREMENT (DC.mA/A)

⚠ WARNING

- Do not measure high power line or high power circuit.
- Do not measure any current that might exceed the specified maximum input values of each measurement ranges. 60 μ A, 3/30/600mA ranges are protected by 0.75A/250V fuse, but 12A range is not protected.
- Before starting the measurement, check if the **RANGE** Switch is set to the correct position.
- Do not measure any voltage in current measurement ranges to avoid electric shock hazard and serious damage to the instrument.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

⚠ WARNING FOR 12A DC MEASUREMENT

- Set **RANGE** Switch to **600/12A** position. Insert **RED** test lead to **12A terminal**.
- 12A DC range is not fuse-protected. Do not measure any current that might exceed 12A to avoid electric shock hazard and serious damage to the instrument.
- Continuous measurement in 12A DC range is restricted **up to 1 minute. More than 1 minute interval** is necessary for the next measurement.
- Do not measure any voltage in 12A DC range. Do not measure +/— terminals of car battery directly. Do not measure household wall socket.

1. Insert black test lead to —COM terminal, and insert red test lead to + terminal.

NOTE : When measuring **12A DC range**, insert red test lead to **12A terminal**.

2. Set **RANGE** Switch to a necessary measurement range in DC.mA/A.
3. Turn off the power of the circuit to be measured. Open the circuit after discharging the capacitors.

4. Connect black test lead to — (earth) side of the circuit being measured and connect red test lead to + (positive) side.

NOTE : Connect the instrument **IN SERIES** to the circuit.

NOTE : Use alligator clips for dangerous current measurement.

5. Turn on the power of the circuit being measured.
6. Read the measurement value on DC/AC scale in reference to "4-2. Meter Scale".
7. Turn off the power of the measuring circuit and discharge the all capacitors. Then, disconnect test leads from the circuit being measured.
8. After finishing the measurement, set **RANGE** Switch to "OFF".

5-5. RESISTANCE MEASUREMENT (Ω)

⚠ WARNING

- Before starting the measurement, check if the **RANGE** Switch is set to the correct position.
- Do not measure any voltage in resistance measurement ranges to avoid electric shock hazard and serious damage to the instrument.
- When measuring in-circuit resistance, turn off power to the circuit being measured and discharge the all capacitors.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

1. Insert black test lead to —COM terminal, and insert red test lead to + terminal.
2. Set **RANGE** Switch to a necessary measurement range in Ω .

3. If the resistor to be measured is connected in a circuit, turn off power to the circuit and discharge the all capacitors.

4. Take **Zero Ω Adjustment**.

Short circuit the black and red test lead pins and turn 0 Ω Adjustment Knob until the meter points to "0" on the Ω scale. Take zero Ω adjustment again when the measurement range is changed.

NOTE : Zero Ω adjustment does not work when the battery is exhausted.

Replace the battery and take zero Ω adjustment again.

5. Disconnect one side of the resistor to be measured and connect test leads to the both side.
6. Read the measurement value on Ω scale in reference to "4-2. Meter Scale".
7. After finishing the measurement, set **RANGE** Switch to "OFF".

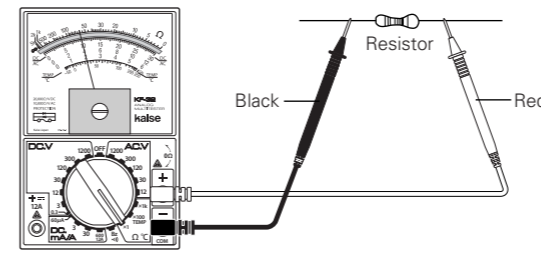


Fig. 9

5-6. TEMPERATURE MEASUREMENT ($^{\circ}$ C)

※810-02 Temperature Probe (option) is necessary

⚠ WARNING

- Before starting the measurement, check if the **RANGE** Switch is set to the correct position.
- Do not measure any voltage in temperature measurement range to avoid electric shock hazard and serious damage to the instrument.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

1. Insert black test lead to —COM terminal, and insert red test lead to + terminal.

NOTE : In this step, insert test leads not temperature probe.

2. Set **RANGE** Switch to TEMP($^{\circ}$ C) position (the same position as $\times 100$).

3. Take **Zero Ω Adjustment**.

Short circuit the black and red test lead pins and turn 0 Ω Adjustment Knob until the meter points to "**CAL**" on the TEMP($^{\circ}$ C) scale.

NOTE : Zero Ω adjustment does not work when the battery is exhausted.

Replace the battery and take zero Ω adjustment again.

4. Remove test leads from the input terminals.
5. Insert black plug of **810-02 Temperature Probe** to —COM terminal, and insert red plug to + terminal.
6. Put the temperature probe on the object to be measured.
7. Read the measurement value on TEMP($^{\circ}$ C) scale. In temperature measurement, read the scale value directly.
8. After finishing the measurement, set **RANGE** Switch to "OFF".

5-7. CONTINUITY TEST (\bullet))

⚠ WARNING

- Before starting the measurement, check if the **RANGE** Switch is set to the correct position.
- Do not measure any voltage in continuity test range to avoid electric shock hazard and serious damage to the instrument.
- When measuring in-circuit continuity, turn off power to the circuit being measured and discharge the all capacitors.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.

1. Insert black test lead to —COM terminal, and insert red test lead to + terminal.
2. Set **RANGE** Switch to Bz (\bullet)) position.

3. When measuring in-circuit continuity, turn off power to the circuit being measured and discharge the all capacitors.

4. Connect test leads to both side of the circuit to be measured. Buzzer sounds when the circuit resistance is approx. 30 Ω or less.

NOTE : Buzzer sound becomes smaller when the battery is exhausted.

5. After finishing the measurement, set **RANGE** Switch to "OFF".

6. MAINTENANCE

6-1. BATTERY AND FUSE REPLACEMENT

⚠ WARNING

- To avoid electrical shock hazard, finish the measurement when to replace the battery and the fuse.
- Detach test leads from measuring circuit and input terminals and set **RANGE** Switch to "OFF".
- Always use the specified fuse. Do not use this instrument shorting fuse holder or without using the fuse.

FUSE SPECIFICATION : 0.75A/250V (ϕ 5.2 \times 20mm)

Battery exhausted : Zero Ω adjustment does not work.

Fuse blow out : The ranges of current, resistance and continuity do not work. Replace the battery or the fuse in the above conditions.

1. Finish the measurement and detach test leads from input terminals. Set **RANGE** Switch to "OFF".
2. Loosen a screw on the rear case and open it from meter side. Then, remove it sliding to the upper side.
3. Replace the exhausted battery into a new 1.5V R6P battery in correct polarity.
4. When replacing the fuse, remove the blowout fuse from the fuse holder and replace it to the new one.
5. Fix the rear case from bottom side and tighten the screw.

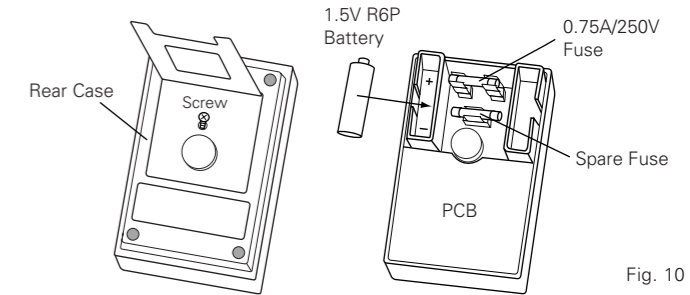


Fig. 10

NOTE : Remove the batteries when the instrument is out of use for a long time. The exhausted batteries might leak electrolyte and corrode the inside.

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.

1. Check the battery connection, polarity, and capacity.
2. Check if the fuse does not blow out or not drop off from the fuse holder.
3. Confirm that the **RANGE** Switch is set correctly.
4. Confirm if the over input, exceeding the specified range value, is not applied.
5. Confirm that measured accuracy is adopted in the operating environment.
6. Confirm that the body of this instrument and test leads have no cracks or any other damages.
7. Check if the instrument is not affected by the strong noise generated from the equipment to be measured or measuring surroundings.

WARRANTY

KF-32 is 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 KF-32 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



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