

kaise

**ANALOG MULTITESTER
INSTRUCTION MANUAL**



KF-20

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 Multitester. WARNINGS with the symbol on the Multitester and this instruction manual are highly important.

Important Symbols

- 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.

WARNING

Do not measure High Power Line that might exceed 2kVA. Measurement on High Power Line is very dangerous. It sometimes includes High Surge Voltage that could cause dangerous arcs of explosive short in the instrument and could result in serious injury to the operator. When measuring high voltage, even for Low Power Line (Low Energy Circuit), take extra care to avoid electrical shock hazard and/or damage to the instrument.

INTRODUCTION

Thank you for purchasing KAISE "MODEL KF-20 ANALOG MULTITESTER". To obtain the maximum performance of this instrument, read this Instruction Manual carefully, and take safe measurement.

1. UNPACKING AND INSPECTIONS

Inspect the instrument and accessories for transport damage. If there is any damage or missing items, ask your local dealer for replacement. Confirm that the following items are contained in the package.

- | | |
|-----------------------------|--------|
| 1. Analog Multitester | 1 pce. |
| 2. Test Lead (100-51) | 1 set |
| 3. Holster | 1 pce. |
| 4. Spare Battery (1.5V R6P) | 1 pce. |
| 5. Instruction Manual | 1 pce. |

2. SPECIFICATIONS

2-1. MEASUREMENT SPECIFICATIONS

DC Voltage (DC-V)	0.3 / 3 / 12 / 30 / 120 / 300 / 1200V
AC Voltage (AC-V)	12 / 30 / 120 / 300 / 1200V
DC Current (DC-mA)	60 μ A / 3mA / 30mA / 300mA
Resistance (Ω)	5K Ω / 500K Ω / 5M Ω
1.5V Battery Test	1.5V R20P / R14P / R6P
Hi Range	1.5V 250mA
Lo Range	1.5V 50mA
Temperature ($^{\circ}$ C)	-50 $^{\circ}$ C ~ +250 $^{\circ}$ C

2-2. GENERAL SPECIFICATIONS

Accuracy	DC : \pm 3% f.s., AC : \pm 4% f.s. Ω / TEMP : \pm 3% f.s.length
Overload Protection	\times 1 and 300mA range : protected by internal diode and 0.3A / 250V fuse
Power Supply	1.5V R6P (AA) battery \times 1
Dimensions & Weight	136(H) \times 90(W) \times 30 (D)mm, 215g
Accessories	100-51 Test Lead \times 1 set Holster \times 1 1.5V R6P (AA) Battery (built-in and spare) \times 1 each Spare Fuse (0.3A/250V) \times 1 (inside the rear case) Instruction Manual
Optional Accessories	660 Clamp Adapter 810-02 Temperature Probe 940 Alligator Clip

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 carefully and observe the following precautions for safety measurements.

3-1. WARNINGS

WARNING 1. 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.

WARNING 2. High Power Line Measurements Prohibited

This instrument is applicable for Low Energy Circuit measurements only. Do not use for High Power Line (High Energy Circuit) measurements such as Distribution Transformers, Bus Bars and Large Motors.

WARNING 3. 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 Multitester, Test Leads, and any part of the circuit. Generally, shock hazard could occur when the current between the circuit, that involves more than 33V rms or 46.7V DC or peak, and ground goes up to 0.5mA or more.

WARNING 4. Dangerous Voltage Measurement Procedures

For dangerous voltage measurement, strictly observe the warnings below. (refer to fig.1)

1. Turn off the circuit to be measured.
2. Plug black test lead to "- (COM)" terminal and red test lead into "+" terminal.
3. Attach black and red alligator clips to test lead pins.
4. Set **RANGE** Switch to desired DC or AC voltage range.
5. Connect black alligator clip to - (earth) side and red alligator clip to + (positive) side of the measuring circuit.
6. Do not hold Multitester and test leads in your hands. Keep safety distance from power source or circuit to be measured not to touch the dangerous voltage.
7. Turn on the circuit to be measured, and read the meter.
8. Turn off the circuit again. Detach alligator clips after confirming the meter returns into "0".

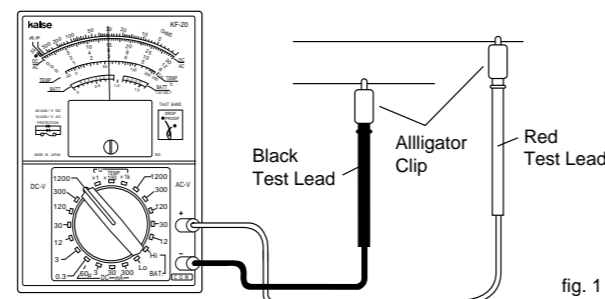


fig. 1

In case of live-line measurement, strictly observe the warnings below (refer to fig 2.)

1. Set **RANGE** Switch to desired DC or AC voltage range.
2. Attach alligator clip to black test lead pin, and connect to - (earth) side of the measuring circuit.
3. Do not hold Multitester in your hands. Keep safety distance from power source or circuit to be measured not to touch the dangerous voltage.
4. Connect red test lead to + (positive) side, and read the meter.
5. Detach red test lead from the circuit first, then detach black alligator clip.

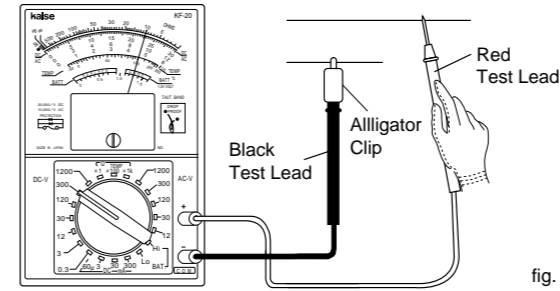
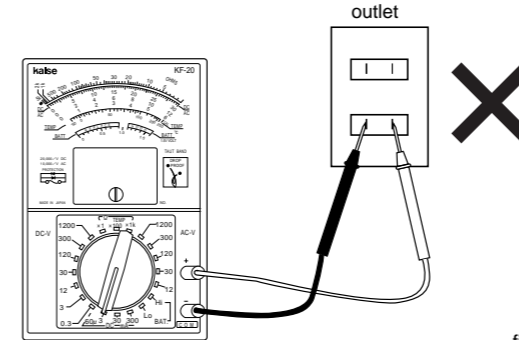


fig. 2

WARNING 5. Correct Selection of RANGE Switch

Always confirm that **RANGE** Switch is set to the correct position. Do not measure voltage in DC-mA, Ω and BAT. ranges.



when measuring DC. mA / Ω range

fig. 3

WARNING 6. Maximum Measurement Range Observance

Measurement exceeding the specified maximum values of each measurement range is prohibited.

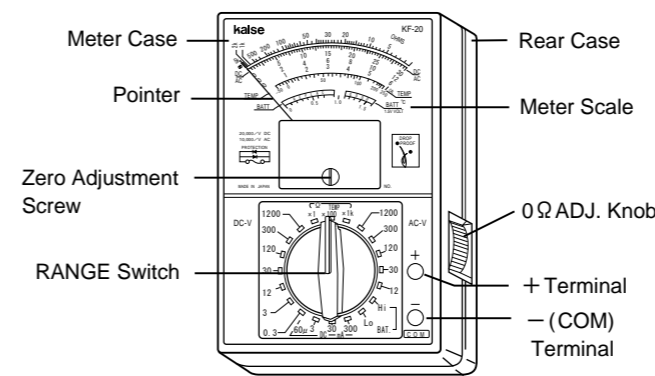
WARNING 7. Test Lead Detachment

Detach test leads from the measuring circuit before rotating **RANGE** Switch or opening 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 naked or barefooted to protect yourself from electrical shock hazard.
- WARNING 3.** Be careful not to get hurt with the sharp test lead pins.
- CAUTION 1.** Do not polish the case or attempt to clean it with any cleansing fluid like gasoline or benzine. If necessary, use silicon oil or antistatic fluid.
- CAUTION 2.** Avoid the multitester from hard mechanical shock or vibration, high temperature and strong magnetic field.
- CAUTION 3.** Remove the batteries when the multitester is out of use for a long time. The exhausted batteries might leak electrolyte and corrode the inside.

4. NAME ILLUSTRATION



100-51 Test Lead

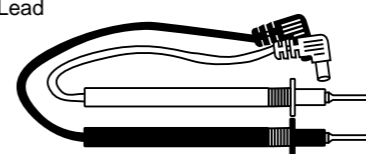


fig. 4

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 highly important for safety measurement.

2. BATTERY
KF-20 contains 1 x 1.5V R6P (AA) battery. Replace it referring to 「6-1. BATTERY REPLACEMENT」 when exhausted.

3. FUSE
KF-20 contains 1 x fast-acting 0.3A/250V (ϕ 5x20mm) fuse to protect Resistance and Current measurement ranges. For replacement, refer to 「6-2. FUSE REPLACEMENT」.

4. ZERO ADJUSTMENT
Before measurement, confirm that meter points to "0". If not, adjust the pointer by **Zero Adjustment Screw** to take accurate measurement.

5. TEST LEAD
Insert black test lead into - (COM) terminal, and red test lead into + terminal.

6. RANGE SWITCH
(1) Range Selection
a. Set the switch to a desired measurement range.
To measure uncertain voltage or current, firstly measure the approximate value at the highest range, then change the switch into the suitable range.
b. For correct voltage and current measurements, select the range to point the right side of the meter scale. (between center scale and maximum scale)
c. For correct resistance measurement, select the range to point around the center of **OHMS** scale.

(2) Confirmation of the Range
Always confirm that **RANGE** Switch is set to the proper measurement range. To avoid serious damage to the instrument, do not measure voltage in DC-mA, Ω and BAT ranges.

WARNING
Detach test leads from the circuit before rotating **RANGE** Switch to avoid electric shock hazard and serious damage to the instrument.

7. Meter Scale Reading

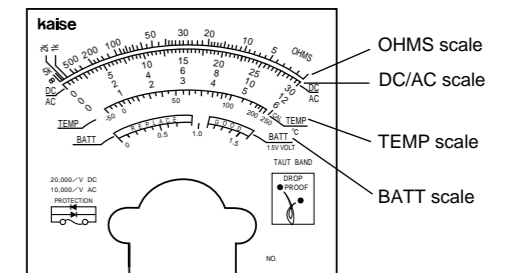


fig. 5

DC/AC scale (for AC/DC Voltage, DC Current measurements : V, μ A, mA)

Select suitable scale from "0 - 6", "0 - 12", or "0 - 30" applying certain multiple.
Reading examples :
DC 0.3V range : Read "0 - 30" scale multiplying by 1/100.
DC 120V range : Read "0 - 12" scale multiplying by 10.
DC 60 μ A range : Read "0 - 6" scale multiplying by 10.
DC 300mA range : Read "0 - 30" scale multiplying by 10.

OHM scale (for Resistance measurement : Ω)
Multiply the scale value depending on the measurement range.
Reading examples :

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

TEMP scale (for Temperature measurement : $^{\circ}$ C)
Read the scale directly.

8. Measurement Accuracy
For accurate measurement, read following notes carefully.
1. Before measurement, confirm that meter points to "0". (zero-adjusted)
2. Select proper range referring to 「5-1. 6-(1) Range Selection」.
3. Read the meter from directly over the pointer.
4. Measurement in strong magnetic field or on iron plate causes reading error or meter sensitivity wrong.
5. Once-a-year periodical calibration is necessary to maintain tolerance accuracy and to take safety measurements.

9. Protection Circuit

The internal protection circuit against over current for meter movement and the internal circuit is installed. But, the instrument should be defective by such as over input measurement, or applying voltage to resistance or current range.

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

⚠ WARNINGS

- Do not measure high power line that might exceed 2kVA.
- Do not exceed the maximum input value of each range.
- Confirm that **RANGE** Switch is set to the correct position.
- Read 「3. SAFETY PRECAUTIONS」 carefully for safety measurement.

1. Plug Black Test Lead into "-" (COM)" terminal and Red Test Lead into "+" terminal.
2. Set **RANGE** Switch to a desired **DC-V** range.
NOTE : To measure uncertain voltage, firstly measure the approximate value at 1200V range, then change the switch into the suitable range. Detach test leads from the circuit before rotating **RANGE** Switch.
3. Connect black test lead to - (earth) side and red test lead to + (positive) side of the measuring circuit.
NOTE : Connect the multimeter **IN PARALLEL** to the circuit.
NOTE : Use alligator clips for dangerous voltage measurement.
4. Read the meter on **DC/AC** scale referring to 「5-1. 7. Meter Scale Reading」 .
5. Detach test leads from the circuit.

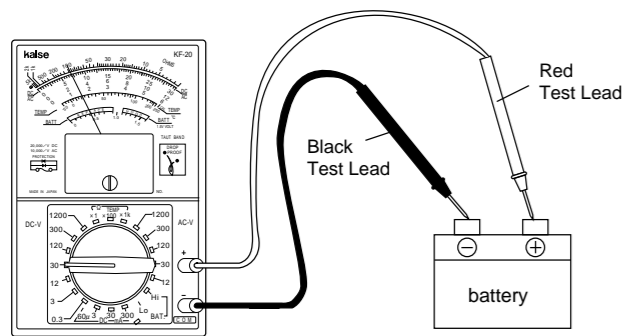


fig. 6

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

⚠ WARNINGS

- Do not measure high power line that might exceed 2kVA.
- Do not exceed the maximum input value of each range.
- Confirm that **RANGE** Switch is set to the correct position.
- Read 「3. SAFETY PRECAUTIONS」 carefully for safety measurement.

1. Plug Black Test Lead into "-" (COM)" terminal and Red Test Lead into "+" terminal.
2. Set **RANGE** Switch to a desired **AC-V** range.
NOTE : To measure uncertain voltage, firstly measure the approximate value at 1200V range, then change the switch into the suitable range. Detach test leads from the circuit before rotating **RANGE** Switch.
3. Connect black test lead to - (earth) side and red test lead to + (positive) side of the measuring circuit.
NOTE : Connect the multimeter **IN PARALLEL** to the circuit.
NOTE : Use alligator clips for dangerous voltage measurement.
4. Read the meter on **DC/AC** scale referring to 「5-1. 7. Meter Scale Reading」 .
5. Detach test leads from the circuit.

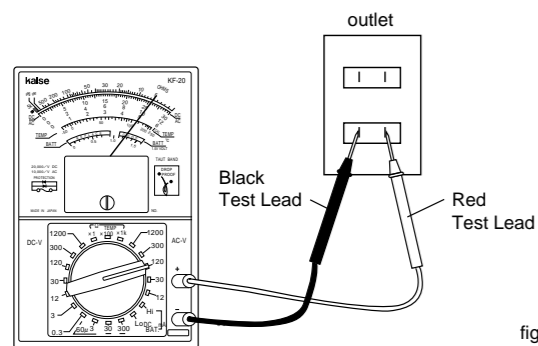


fig. 7

⑤

5-4. DC CURRENT MEASUREMENTS (DC-mA)

⚠ WARNINGS

- Do not measure over 300mA DC.
- Do not exceed the maximum input value of each range.
- Confirm that **RANGE** Switch is set to the correct position.
- Read 「3. SAFETY PRECAUTIONS」 carefully for safety measurement.

1. Plug Black Test Lead into "-" (COM)" terminal and Red Test Lead into "+" terminal.
2. Set **RANGE** Switch to a desired **DC-mA** range.

⚠ WARNINGS

- 300mA range is protected by 0.3A/250V fuse, but 60uA, 3mA, and 30mA ranges are not.
- Do not measure voltage in **DC-mA** range.
- Do not measure wall outlet or car battery by mistake.

3. Turn off the circuit to be measured and discharge the capacitors.
4. Connect black test lead to - (earth) side and red test lead to + (positive) side of the measuring circuit.
NOTE : Connect the multimeter **IN SERIES** to the circuit.
NOTE : Using alligator clips is recommended for safety measurement.
5. Turn on the circuit to be measured.
6. Read the meter on **DC/AC** scale referring to 「5-1. 7. Meter Scale Reading」 .
7. Turn off the measured circuit again and discharge the capacitors.
8. Detach test leads from the circuit.

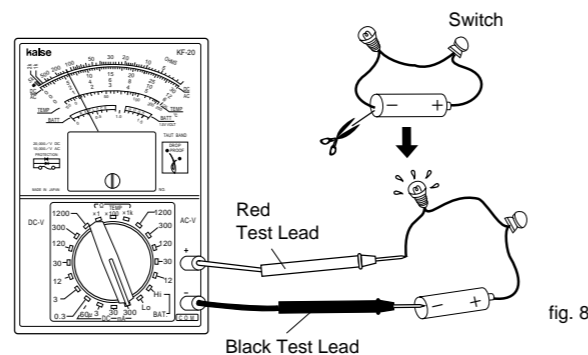


fig. 8

5-5. RESISTANCE MEASUREMENTS (Ω)

⚠ WARNINGS

- Do not measure voltage in Ω range.
- When measuring in-circuit resistor, turn off the circuit to be measured and discharge the capacitors.

1. Plug Black Test Lead into "-" (COM)" terminal and Red Test Lead into "+" terminal.
2. Set **RANGE** Switch to a desired Ω range.
3. When measuring in-circuit resistor, turn off the circuit to be measured and discharge the capacitors.
4. **0Ω Adjustment**
Short-circuit metal pins of the test leads. Turn **0Ω ADJ. Knob** until the meter points to "0Ω".
NOTE : 0Ω Adjustment is necessary for each time when Ω range is selected.
NOTE : 0Ω Adjustment does not work if the battery is exhausted. Replace it referring to 「6-1. BATTERY REPLACEMENT」 .
5. Connect test leads to resistor to be measured detaching its one side from the circuit.
6. Read the meter on **OHMS** scale referring to 「5-1. 7. Meter Scale Reading」 .
NOTE : Read the scale directly when measuring in "x 1" range. In "x 100" range, multiply the scale by 100, and in "x 1k" range, multiply by 1,000.
NOTE : For correct resistance measurement, select the range to point around the center of **OHMS** scale.
7. Detach test leads from the resistor.

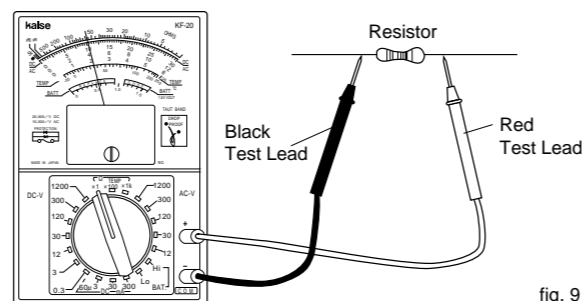


fig. 9

⑥

5-6. 1.5V BATTERY TEST (BATT)

Battery exhausted level can be tested in Hi (1.5V 250mA), or Lo (1.5V 50mA) ranges.

Testable batteries : 1.5V R20P (D), 1.5V R14P (C), 1.5V R6P (AA), 1.5V R03 (AAA)

⚠ WARNINGS

- Do not test non-specified batteries to avoid electric shock hazard and serious damage to the instrument.
- Do not test car battery.
- Do not measure voltage or current in **BAT** range.

1. Plug Black Test Lead into "-" (COM)" terminal and Red Test Lead into "+" terminal.
2. Set **RANGE** Switch to "Hi" or "Lo" of **BAT** range.
NOTE : "Lo" range applies 50mA, and "Hi" range applies 250mA to the battery. Confirm consumption current of the instruments that the battery will be used to select the proper testing range.
Popular range selection : 1.5V R20P (D), 1.5V R14P (C) : "Hi" range
1.5V R6P (AA), 1.5V R03 (AAA) : "Lo" range
3. Connect black test lead to - (earth) side and red test lead to + (positive) side.
4. Read the meter on **BATT** scale.
Meter points "**GOOD (blue)**" : The tested battery is good.
Meter points "**REPLACE (red)**" : The tested battery is exhausted and needs to be replaced.
NOTE : Even if meter points "REPLACE (red)" for 1.5V R6P (AA) battery tested in "Lo" range, it may be used with low consumption current instruments.

5-7. TEMPERATURE MEASUREMENTS (°C)

810-02 temperature probe (option) is necessary. Measurement range is -50°C to +250°C.

1. Plug Black Test Lead into "-" (COM)" terminal and Red Test Lead into "+" terminal.
2. Set **RANGE** Switch to **TEMP (x100)** range.
3. **0Ω Adjustment**
Short-circuit metal pins of the test leads. Turn **0Ω ADJ. Knob** until the meter points to "CAL" line on **TEMP** scale.
4. Remove test leads from the terminals, and insert 810-02 temperature probe.
5. Connect temperature probe to the object to be measured.
6. Read the meter on **TEMP** scale.

6. MAINTENANCE

6-1. BATTERY REPLACEMENT

⚠ WARNINGS

- To avoid electrical shock, detach test leads from circuit when when opening rear case for battery or fuse replacement.
- Be sure to tighten the screw of rear case after the battery replacement

Replace the batteries when it is exhausted and "0Ω Adjustment" does not work.

1. Detach test leads from the circuit.
2. Unscrew rear case.
3. Remove rear case opening from meter side and slide to the upward.
4. Replace an exhausted battery into a new 1.5V R6P (AA) battery in correct polarity.
5. Close rear case fitting from bottom to up, and tighten the screw.

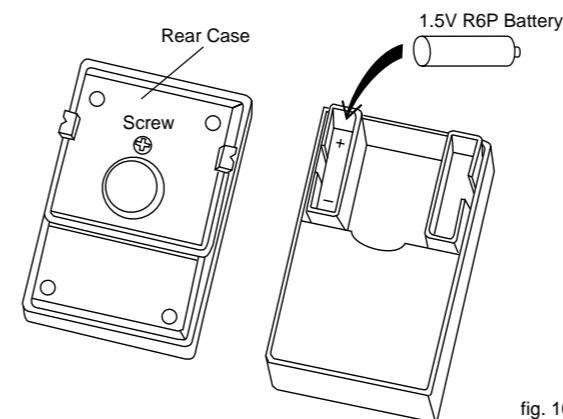


fig. 10

NOTE : Installed battery is for inspection purpose and might be exhausted earlier than the new battery.

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6-2. FUSE REPLACEMENT

⚠ WARNINGS

- Always use the specified fuse. Do not use the instrument shorting fuse holder or without using the fuse.
- Be sure to tighten the screw of rear case after the fuse replacement.

DC Current and Resistance measurement cannot be made if fuse blows out. This instrument contains one spare fuse inside the rear case.

1. Open rear case referring to 「6-1. BATTERY REPLACEMENT」 .
2. Replace a blowout fuse into a new one.
Fuse type : Fast-acting 0.3A/250V (φ 5x20mm)
3. Close rear case fitting from bottom to up, and tighten the screw.

6-3. 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.

6-4. 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. Confirm that **RANGE** Switch is set to the correct position.
3. Confirm that the body of this instrument and handle insulators of the Test Leads have no cracks or any other damages.
4. Check if any noise affects the instrument. This instrument is fully shielded against noise, but possibly to be affected by very strong noise.

WARRANTY

KF-20 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-20 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 : +81-268-35-1600 (REP.) / 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.

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