

# kaise

## BENCH-TOP DIGITAL MULTIMETER INSTRUCTION MANUAL

### SK-4033 / SK-4035

Thank you for purchasing **KAISE MODEL SK-4033/4035 BENCH-TOP DIGITAL MULTIMETERS**. To obtain the maximum performance of this instrument, read this Instruction Manual carefully, and take safe measurement.

### Features

#### ■Comparator Function

Useful for the quality check in the production line. Comparator relay output is also possible by using the output terminal.

#### ■Output Terminal

Connecting to the external inspection equipment is possible by using the equipped photoMOS relay output terminal.

#### ■True RMS

SK-4035 assures the accurate measurement by True RMS.

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# 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 Insulation Tester. WARNINGS with the symbol  on the Insulation Tester 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.



## WARNING

Do not measure High Power Line (High Energy Circuits). High Power Line is very dangerous and sometimes includes High Surge Voltage that could cause explosive short in the instrument and could result in serious injury to the operator. This instrument is for Low Power Line measurement. Even in the Low Power Line, pay careful attention when measuring high voltage line.

## 1. UNPACKING AND INSPECTIONS

Confirm that 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. Bench-top Digital Multimeter | 1 pce. |
| 2. Test Lead (100-57)           | 1 set  |
| 3. AC Adapter (897)             | 1 pce. |
| 4. Spare Fuse (0.5A/250V)       | 1 pce. |
| 5. Instruction Manual           | 1 pce  |

## 2. SPECIFICATIONS

### 2-1. General Specifications

#### 1. DISPLAY (LCD) :

##### (1) Main LCD

- a. Numerical display : 4000 count, maximum reading 4000, 21mm high
- b. Units and symbols : AUTO, —,  $\equiv$ ,  $\sim$ ,  $\Omega$ ,  $k\Omega$ ,  $M\Omega$ , mV, V,  $\mu A$ , mA, A, and decimal point

##### (2) Comparator setting LCD

- a. Numerical display : Maximum reading 3999, 7.5mm high
- b. Units and symbols : Bz on, H, G, L

#### 2. OPERATING PRINCIPLE : $\Sigma \Delta$ Conversion

#### 3. AC MEASUREMENT : SK-4033 : Average rectification, SK-4035 : True RMS (AC coupling)

#### 4. RANGE SELECTION : Auto range / manual range

#### 5. FUNCTION SELECTION : Manual (key operation)

#### 6. POLARITY : Auto ("—" symbol is shown in minus)

#### 7. OVERLOAD WARNING : "OL" indication when exceeding the maximum reading ※see "4. Overload Warning" (p. 10) for details.

#### 8. SAMPLING RATE : 10 times/second

#### 9. COMPARATOR :

- a. Setting display : LCD (sub-display)
- b. Setting method : Key operation
- c. Setting range :  $-3999$  to  $+3999$
- d. Test method :  $L < \text{lower limit} \leq G \leq \text{higher limit} < H$
- e. Comparator display : LED (L : red, G: green, H : red)
- f. Comparator relay output : photoMOS relay  
Loading voltage : 250V DC, 250V AC MAX. / ON resistance :  $35\Omega$  MAX.  
Continuous loading current : 120mA MAX.  
Output terminal ※see "2. Dimensions of Recommended Solderless Terminal" (p. 16) for details.
- g. Buzzer : OFF • GO • LO • HI • HI and LO are selectable

#### 10. DIELECTRIC STRENGTH : $\pm 500V$ DC (between COM terminal and ground)

#### 11. OPERATING TEMPERATURE & HUMIDITY : $0^{\circ}C$ to $35^{\circ}C$ , 80%RH or less in non-condensing $35^{\circ}C$ to $50^{\circ}C$ , 70%RH or less in non-condensing

#### 12. STORAGE TEMPERATURE & HUMIDITY : $-20^{\circ}C$ to $60^{\circ}C$ , 70%RH or less in non-condensing

#### 13. TEMPERATURE COEFFICIENT : Accuracy at $23^{\circ}C \pm 5^{\circ}C \times 0.2/^{\circ}C$

#### 14. POWER SUPPLY : AC adapter

Input : 100V to 240V AC, 50/60Hz

Output : 9V DC ※Switching type

#### 15. CURRENT CONSUMPTION : Approx. 18mA or less (normal), approx. 32mA or less (comparator), approx. 57mA or less (comparator & buzzer)

**16. FUSE** : 10A range (p/n F30) : 10A/600V ( $\phi 6.3 \times 32$ mm),  $\mu A$ /mA range (p/n F29) : 3A/600V ( $\phi 6.3 \times 32$ mm), power supply (p/n F31) : 0.5A/250V ( $\phi 5.2 \times 20$ mm),  $\mu A$ /mA terminal (p/n F31) : 0.5A/250V ( $\phi 5.2 \times 20$ mm)

**17. DIMENSIONS & WEIGHT** : 95(H)  $\times$  200(W)  $\times$  260(D)mm, approx. 1,140g

**18. ACCESSORIES** : 100-57 Test Lead, 897 AC Adapter, F31 Spare Fuse (0.5A/250V for  $\mu A$ /mA terminal), Instruction Manual

**19. OPTIONAL ACCESSORIES** : 660 AC/DC Clamp Adapter, 821 AC Clamp Adapter, 100-41 Test Lead Kit, 100-62 Test Lead Set, 940 Alligator Clip, 731 BNC Conversion Adapter

## 2-2. Measurement Specifications (23°C $\pm$ 5°C, <80%RH in non-condensing)

### 1. DC Voltage (DC. V)

Range	Resolution	Accuracy	Input resistance	Maximum input	Overload protection
400.0mV	0.1mV	$\pm 0.3\% \text{rdg} \pm 2 \text{dgt}$	$> 100 \text{M}\Omega$	600V DC (for 10 sec.)	600V DC, 450V AC rms for 1 min.
4.000V	1mV		$\div 11 \text{M}\Omega$	600V DC	1000V DC 1000V AC rms for 1 minute
40.00V	10mV		$\div 10 \text{M}\Omega$		
400.0V	100mV				
600V	1V				

Range selection : auto range / manual range

### 2. AC Voltage (AC. V)

SK-4033 : Average rectification / SK-4035 : True RMS

Range	Resolution	Accuracy	Input resistance	Maximum input	Overload protection
400.0mV	0.1mV	$\pm 1.0\% \text{rdg} \pm 5 \text{dgt}$ (50Hz to 500Hz)	$> 100 \text{M}\Omega$	600V AC (for 10 sec.)	600V DC, 450V AC rms for 1 min.
4.000V	1mV		$\div 11 \text{M}\Omega$	600V AC rms	1000V DC 1000V AC rms for 1 minute
40.00V	10mV		$\div 10 \text{M}\Omega$		
400.0V	100mV				
600V	1V				

Range selection : auto range / manual range

※SK-4035 : Crest factor : 3:1 of the full scale (in 600V range, 3:1 at 300V or less)

Accuracy assured for the input of 5% or more of the full scale value.

### 3. DC Current (DC. A)

Range	Resolution	Accuracy	Voltage drop	Maximum input	Overload protection	Range selection
400.0 $\mu$ A	0.1 $\mu$ A	$\pm 0.75\% \text{rdg} \pm 2 \text{dgt}$	$< 0.05 \text{V}$	400 $\mu$ A DC	0.5A/250V fuse (input terminal) 3A/600V fuse (circuit)	Manual
4000 $\mu$ A	1 $\mu$ A		$< 0.25 \text{V}$	400mA DC		
40.00mA	10 $\mu$ A		$< 0.1 \text{V}$			
400.0mA	100 $\mu$ A		$< 0.6 \text{V}$			
10.00A	10mA	$\pm 1.5\% \text{rdg} \pm 2 \text{dgt}$	$< 0.5 \text{V}$	10A DC	10A/600V fuse (circuit)	

## 4. AC Current (AC. A)

SK-4033 : Average rectification / SK-4035 : True RMS

Range	Resolution	Accuracy	Voltage drop	Maximum input	Overload protection	Range selection
400.0 $\mu$ A	0.1 $\mu$ A	$\pm 1.5\% \text{rdg} \pm 6 \text{dgt}$ (50Hz to 500Hz)	$< 0.05 \text{V}$	400 $\mu$ A AC rms	0.5A/250V fuse (input terminal) 3A/600V fuse (circuit)	Manual
4000 $\mu$ A	1 $\mu$ A		$< 0.25 \text{V}$			
40.00mA	10 $\mu$ A		$< 0.1 \text{V}$	400mA AC rms		
400.0mA	100 $\mu$ A		$< 0.6 \text{V}$			
10.00A	10mA		$< 0.5 \text{V}$	10A AC rms	10A/600V fuse (circuit)	

※SK-4035 : Crest factor : 3:1 of the full scale

Accuracy assured for the input of 5% or more of the full scale value.

## 5. Resistance ( $\Omega$ )

Range	Resolution	Accuracy	Max. open circuit voltage	Test current	Overload protection	Range selection
400.0 $\Omega$	0.1 $\Omega$	$\pm 0.3\% \text{rdg} \pm 3 \text{dgt}$	2.4V	$\leq 1.1 \text{mA}$	400V DC 280V AC rms for 1 minute	Auto / Manual
4.000k $\Omega$	1 $\Omega$	$\pm 0.3\% \text{rdg} \pm 2 \text{dgt}$	1.2V	$\leq 110 \mu\text{A}$		
40.00k $\Omega$	10 $\Omega$			$\leq 12.0 \mu\text{A}$		
400.0k $\Omega$	100 $\Omega$			$\leq 1.2 \mu\text{A}$		
4.000M $\Omega$	1k $\Omega$	$\pm 1\% \text{rdg} \pm 2 \text{dgt}$		$\leq 0.12 \mu\text{A}$		
40.00M $\Omega$	10k $\Omega$	$\pm 3\% \text{rdg} \pm 4 \text{dgt}$		$\leq 0.12 \mu\text{A}$		

# 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.
- Turn off the circuit to be measured when connecting the test leads.
- After finishing the measurement, turn off the circuit to be measured again and discharge the all capacitors. Then, detach alligator clips (test leads) from the circuit.

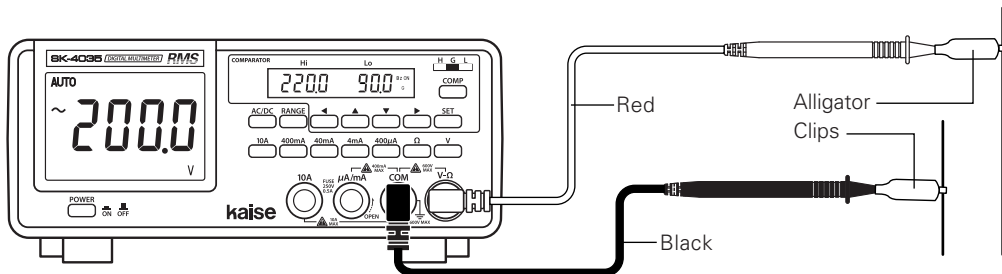


Fig. 1

**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.

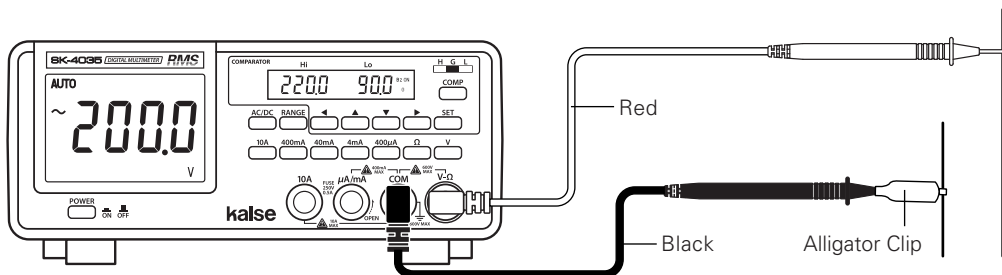


Fig. 2

## **WARNING 6. Correct Function Settings**

Always confirm that the correct measurement function is selected. Do not measure any voltage except in the Voltage (V) function.

## **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 and the input terminals when changing the measurement function or removing the top case for fuse replacement.

## **3-2. AC Adapter**

### **WARNING**


Read the following precautions carefully to prevent electric shock, fire accident, or damage to the instrument


- Be sure to use with the specified power supply voltage.
- Insert the power plug and the connector fully into the each sockets.
- Do not pull the power cord when removing the power plug from the socket.
- Always keep the power plug and connector clean.
- Do not insert and remove the power plug and the connector with the wet hand.
- Do not damage, bend hardly, pinch, compress, or modify the power cord.
- Do not apply mechanical shock to the adapter part. Do not drop it off.
- Do not use the power cord that has any damage or melted coating.


### **CAUTION**


Do not place high frequency welding machine or equivalent near the power source. The noise might affect the instrument and would cause the mechanical error.


## **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.

 **WARNING 2.** Do not measure the electricity in 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.** Keep 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 benzene. If necessary, use silicon oil or antistatic fluid.

## 4. NAME ILLUSTRATION

### FRONT PANEL

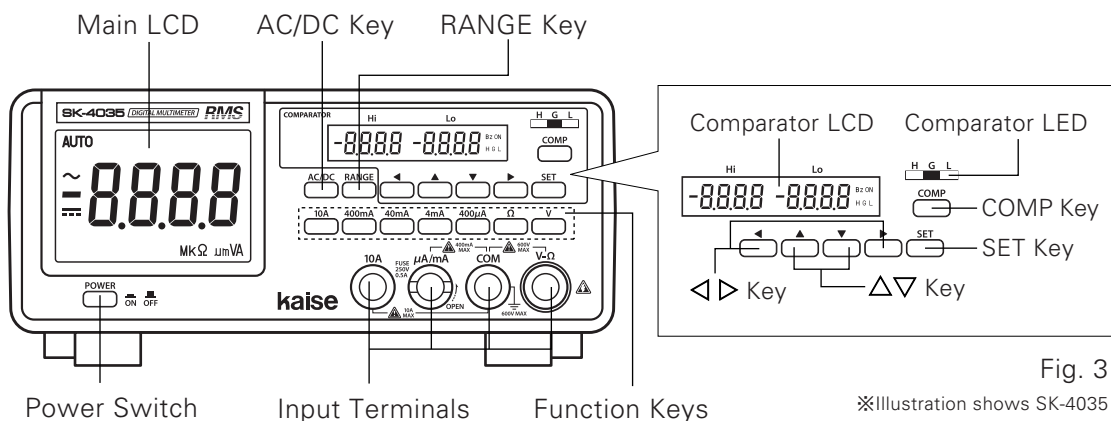


Fig. 3

### REAR PANEL

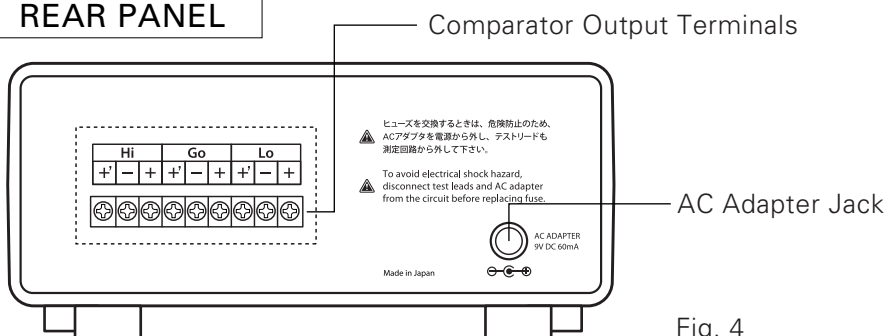


Fig. 4

## 4-1. LCD

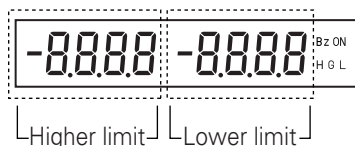
### 1. Main LCD



AUTO : Auto range  
 — : Minus  
 ≡ : DC  
 ~ : AC

Ω, kΩ, MΩ : Units of resistance  
 mV, V : Units of voltage  
 μA, mA, A : Units of current

### 2. Comparator LCD



Bz on : ON : buzzer ON / OFF : buzzer OFF

H : Buzzer when the measured value is higher than the higher limit.  
 G : Buzzer when the measured value is between higher and lower limits.  
 L : Buzzer when the measured value is lower than the lower limit.



## 4-2. Measurement Key Switches

### 1. Power Switch

Press this switch to turn ON the instrument. Press it again to turn OFF.

### 2. AC/DC Key

The key to change DC ⇔ AC during voltage and current measurements. Default setting is DC.

### 3. RANGE Key : Range Hold

Manual-range measurement is possible by pressing this key during the auto-range measurement in voltage and resistance measurements ("AUTO" disappears from LCD). To change the measurement range in manual-range, press RANGE Key. Check decimal point and select the suitable ranges.

**To return to Auto-range :** Press RANGE Key for 2 seconds or more. ("AUTO" lights up).

### 4. Function Keys

Press one of these keys to select the measurement function.

## 4-3. Comparator Key Switch & LED

### 1. $\triangle \nabla$ Key

Press this key to set higher and lower limits, or to enter comparator setting mode.

### 2. $\triangleleft \triangleright$ Key

Press this key to change the setting digit, or to enter comparator setting mode.

### 3. SET Key

Press this key to enter comparator setting mode, or to fix the settings.

### 4. COMP Key

Press this key to start or finish the comparator measurement.

### 5. Comparator LED

The LED to show the comparator results.

H (RED) : Lights up when the measured value is higher than the higher limit.

G (GREEN) : Lights up when the measured value is between higher and lower limits.

L (RED) : Lights up when the measured value is lower than the lower limit.

## 4-4. Input Terminals

Insert black test lead to COM terminal and insert red test lead to other terminals depending on the selected measurement functions.

## 4-5. Comparator Output Terminals

Comparator relay output is possible by connecting solderless terminals. For details, see "6-4. Comparator Relay Output".

## 4-6. AC Adapter Jack

Connect the supplied AC Adapter to this jack.

# 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. AC Adapter

The power supply of this instrument is AC adapter. Connect the supplied "897 AC Adapter" before starting the measurement.

#### AC Adapter Specification

Input : 100V to 240V AC, 50/60Hz

Output : 9V DC

※Switching type



#### Caution for the Polarity



The polarity of AC adapter for SK-4033/4035 is "Center Plus". Be careful about this when using the commercially available AC adapter.

### 3. Fuse

Current measurement ranges are protected by 0.5A/250V (for power supply &  $\mu$ A/mA terminal), 3A/600V (for  $\mu$ A/mA range) and 10A/600V (for 10A range) fuses. See "7-1. Fuse Replacement" for their replacement.

### 4. Overload Warning




LCD shows "OL" when the measurement exceeds the maximum readings of each measurement functions.

**NOTE :** In 600V range, LCD shows "OL" when exceeding 1001 count. The display blinks when the measurement value is from 600V to 1000V.

**NOTE :** In 10A range, LCD shows "OL" when exceeding 2001 count. The display blinks when the measurement value is from 10.01A to 20.00A.

# 5. Symbol Mark

The following symbol marks shown on the instrument and instruction manual are listed in IEC-61010-1 and ISO 3864.

	Warning and caution showing that the user should refer to instruction manual		
	Alternating Current (AC)		Double Insulation

memo

## 5-2. Voltage Measurement ( $\equiv V$ • $\sim V$ )



### WARNING

- Do not measure high power line or high power circuit.
- Do not measure any voltage that might exceed the specified maximum input value.
- Before starting the measurement, check the voltage function is selected.
- Detach test leads from the measuring circuit when changing the measurement function.
- 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 V- $\Omega$  terminal.
2. Turn on the instrument, or press **V Key** when moving from the other functions.
3. Press AC/DC Key to select DC ( $\equiv$ ) or AC ( $\sim$ ).

**NOTE :** Display drifting would occur due to the high internal resistance of the instrument, but it does not affect the instrument.

4. Connect black test lead to — (earth) side of the circuit to be 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.

5. Read the measurement value on LCD.
6. Detach the test lead from the circuit and turn off the instrument.

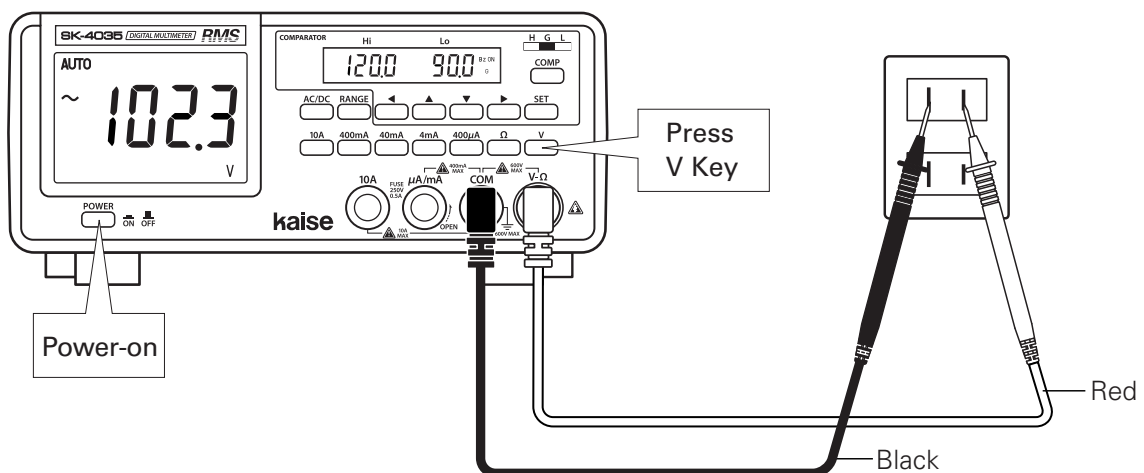


Fig. 5

**Available Functions :** Comparator, Range hold

## 5-3. Resistance Measurement ( $\Omega$ )



### WARNING

- Before starting the measurement, check the  $\Omega$  function is selected.
- Do not measure any voltage in resistance measurement function to avoid electric shock hazard and serious damage to the instrument.
- Detach test leads from the measuring circuit when changing the measurement function.
- 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 V- $\Omega$  terminal.
2. Turn on the instrument and press  **$\Omega$  Key**.
3. If the resistor to be measured is connected in the circuit, turn off the circuit and discharge the all capacitors.
4. Disconnect one side of the resistor to be measured and connect test leads to the both side.
5. Read the measurement value on LCD.
6. Detach the test lead from the circuit and turn off the instrument.

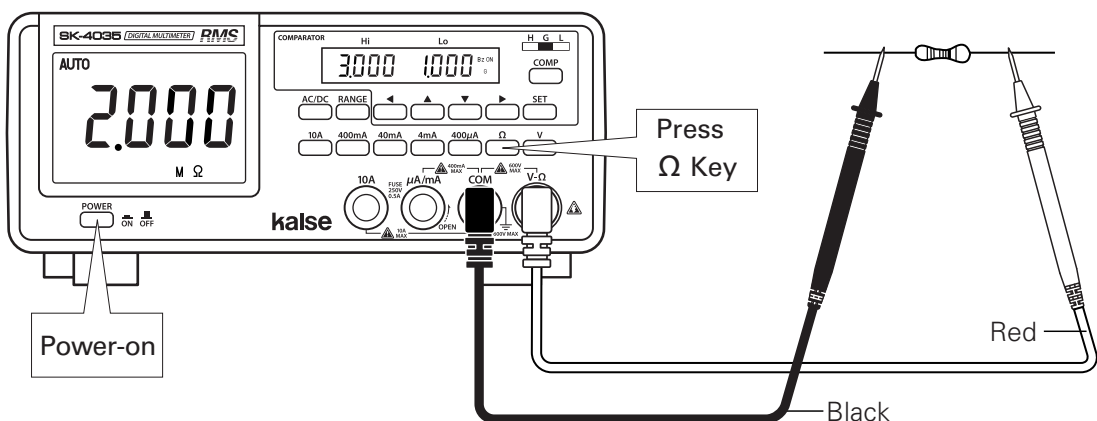


Fig. 6

**Available Functions :** Comparator, Range hold

### Important Note for Resistance Measurement

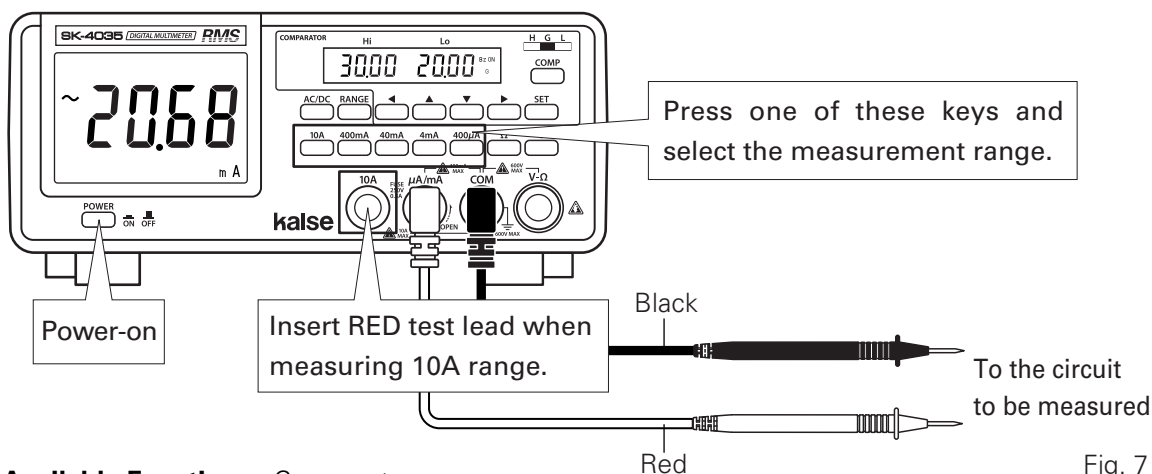
When measuring in  $4M\Omega$  range or higher, external noise might affect the measurement and might drift the display. TO prevent this problem, we recommend to use the shielded wires instead of the supplied test leads. Using the wire with BNC connector is also possible by using "731 BNC conversion adapter" (option).

## 5-4. Current Measurement ( $\overline{\sim}$ A • $\sim$ A )

### **WARNING**

- Do not measure high power line or high power circuit.
- Do not measure any current that might exceed the specified maximum input value.
- Before starting the measurement, check the correct current function is selected.
- Do not measure any voltage in current measurement function to avoid electric shock hazard and serious damage to the instrument.
- Detach test leads from the measuring circuit when changing the measurement function.
- Read "3. SAFETY PRECAUTIONS" carefully to avoid electric shock hazard and serious damage to the instrument.
- Insert **RED** test lead to **10A terminal** when measuring **10A range**.

1. Insert black test lead to COM terminal and insert red test lead to  $\mu$ A/mA or 10A terminal.  
**NOTE :** Insert **RED** test lead to **10A terminal** when measuring **10A range**.
2. Turn on the instrument.
3. Press one of the **400  $\mu$ A, 4mA, 40mA, 400mA, or 10A Keys**, and select the suitable measurement range.
4. Press AC/DC Key to select DC ( $\overline{\sim}$ ) or AC ( $\sim$ ).
5. Turn off the circuit to be measured. Open the circuit after discharging the capacitors.
6. Connect black test lead to — (earth) side of the circuit to be 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.
7. Turn on the circuit to be measured and read the measurement value on LCD.
8. Turn off the circuit and discharge the all capacitors.
9. Detach the test lead from the circuit and turn off the instrument.



**Available Functions :** Comparator

Fig. 7

## 6. COMPARATOR FUNCTION

### What is Comparator Function?

The function useful to check GOOD/FAIL test result under the certain threshold. You can check the result by buzzer and LED in accordance with the preset higher and lower limit. SK-4033/4035 is also capable of comparator relay output by using the solderless terminal.

### 6-1. Comparator Settings

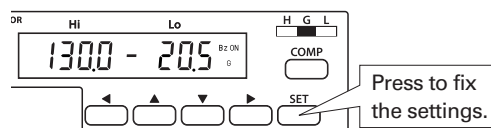
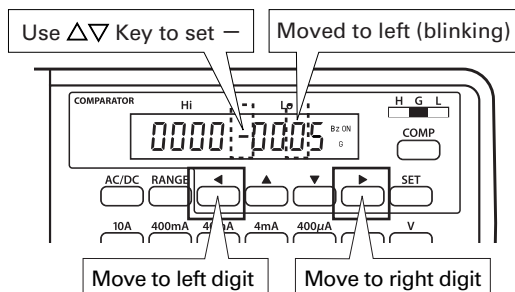
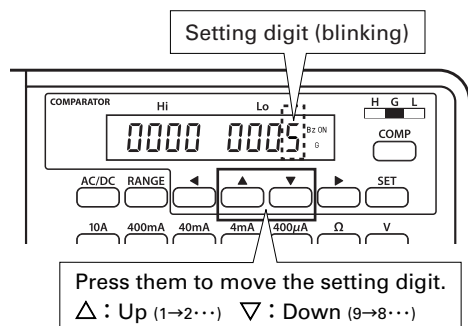
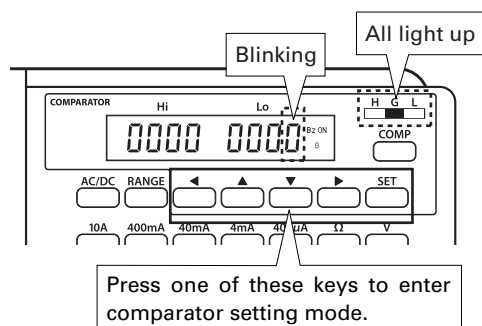
1. Turn on the instrument.
2. Enter the comparator setting mode by pressing one of the  $\Delta\nabla$ ,  $\triangleleft\triangleright$ , or SET Keys. Right digit of "Lo" side of the comparator LCD blinks.
3. Press  $\Delta\nabla$  Keys and set the necessary number. Keep it pressing for 2 seconds or more to speed-up.
4. Press  $\triangleleft\triangleright$  Keys to move the setting digit to left or right. The setting digit is blinking.
5. Press  $\Delta\nabla$  Keys to select minus (—).
6. Repeat the steps of 3 to 5, and set higher, lower or both limits.

**NOTE :** Setting range is 3999 to —3999.

**NOTE :** The comparator condition can be selected from the following.

- ① Measured value is higher than the higher limit.
- ② Measured value is between higher and lower limits.
- ③ Measured value is lower than the lower limit.

7. Press SET Key to fix the comparator settings.



### Important Notes for Comparator Settings

- The all LEDs light up in the comparator setting mode.
- The keys except for  $\Delta\nabla$ ,  $\triangleleft\triangleright$ , and SET keys do not work in the comparator setting mode.
- The comparator setting should be Higher limit (Hi) > Lower limit (Lo).

Fig. 8

## 6-2. Buzzer Settings

Buzzer timing can be selected as needed.

1. Enter buzzer setting mode by pressing COMP Key for 2 seconds or more.
  2. Press COMP Key and select buzzer timing from ① to ⑤ shown in fig. 9.
- NOTE :** Default setting is ①.
3. Press COMP Key again for 2 seconds or more to fix the buzzer setting and to return to the normal measurement mode.

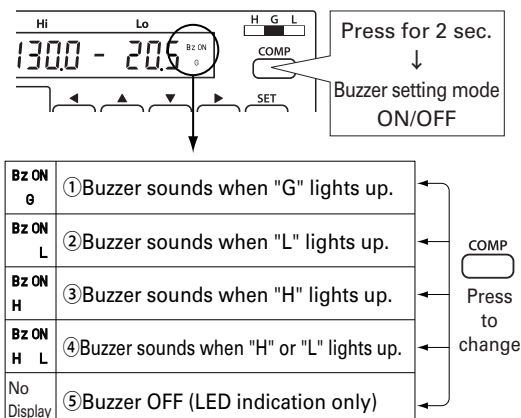


Fig. 9

## 6-3. Comparator Measurement

1. Press COMP Key after setting threshold and buzzer timing. Comparator measurement is started.

**NOTE :** The instrument is set to "manual range" in comparator measurement ("AUTO" disappears from LCD). The range is fixed where the COMP Key is pressed. Select the appropriate range before pressing the key when necessary.

2. Buzzer and LED show the test result according to the preset higher or lower limits.

H (red) : measurement is higher than the higher limit.  
 G (green) : measurement is between higher and lower limits.  
 L (red) : measurement is lower than the lower limit.

$L < \text{Lower Limit} \leq G \leq \text{Higher Limit} < H$

3. Press COMP Key to finish the comparator measurement.

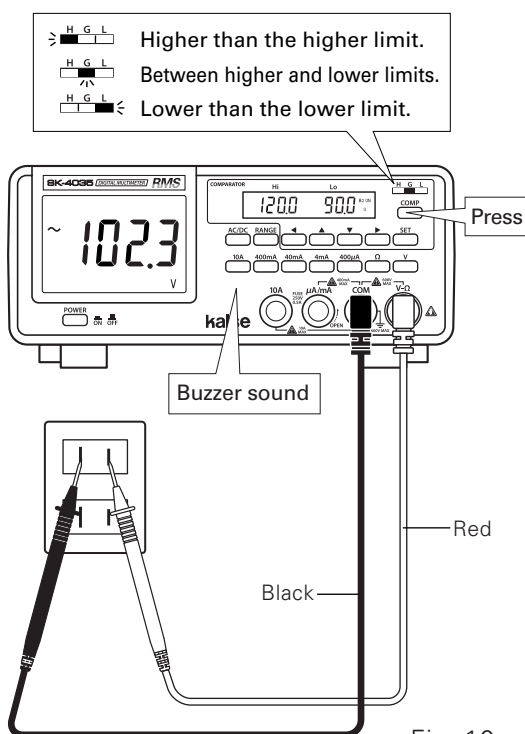


Fig. 10

## Important Notes for Comparator Measurement

- Comparator measurement should be finished automatically by the following operations.
  - Measurement function is changed.
  - AC/DC or RANGE Keys are pressed.
- Comparator test speed is the same as the display sampling speed (10 times/second).
- The instrument remains set to "manual range" after finishing the comparator measurement. To measure in "auto range", press RANGE Key for 2 seconds or more until "AUTO" sign is displayed on LCD.



## Important Note for Comparator Measurement

- When taking the comparator measurement with the input terminals are opened, such as when the resistance measurement, comparator always shows "Hi" result with "OL" sign on LCD. To prevent this problem, add GO/STOP signal to your inspection system in reference to the circuit diagram shown in Fig. 11.

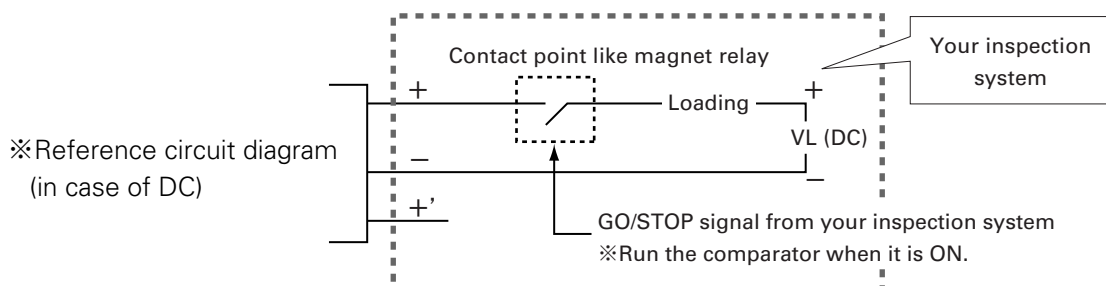


Fig. 11

## 6-4. Comparator Relay Output

Connect solderless terminal to the output terminal on the rear panel to output the comparator result.

**NOTE :** See the connecting diagrams in fig. 12 when using the relay output.

**NOTE :** Do not apply the loading that might exceed the relay specification.

### Relay specification

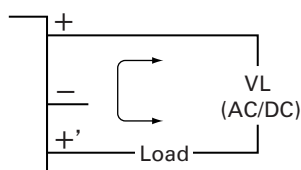
Loading voltage : 250V DC, 250V AC MAX.

ON resistance : 35Ω MAX.

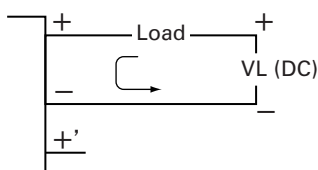
Continuous loading current : 120mA MAX.

### 1. Connecting Diagram

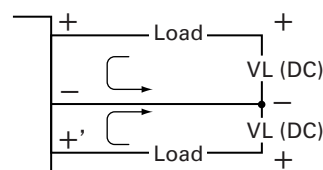
①AC/DC Loading



②DC Loading (1)



③DC Loading (2)

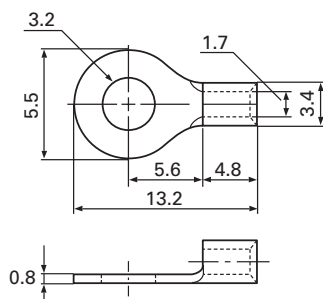


**NOTE :** Sum of continuous load current must not exceed the maximum rating.

Fig. 12

### 2. Dimensions of Recommended Solderless Terminal

①Circle-shaped terminal



②Y-shaped (tip open type) terminal

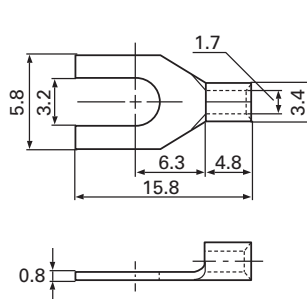


Fig. 13

# 7. MAINTENANCE

## 7-1. Fuse Replacement



### WARNING

- To avoid electrical shock hazard, finish the measurement when to replace the fuse.
- Detach test leads from measuring circuit and input terminals and disconnect AC Adapter from power source.
- Always use the specified fuse. Do not use this instrument shorting fuse holder or without using the fuse.

### 1. Internal Fuses

※10A range (F30) : 10A/600V ( $\phi 6.3 \times 32\text{mm}$ ),  $\mu\text{A}/\text{mA}$  range (F29) : 3A/600V( $\phi 6.3 \times 32\text{mm}$ ), Power supply (F31) : 0.5A/250V( $\phi 5.2 \times 20\text{mm}$ )

1. Detach test leads from measuring circuit and input terminals and disconnect AC Adapter from power source.
2. Remove 4-screws from the legs on the bottom case and remove 2-legs on rear panel side.
3. Remove the top case.
4. Replace the blowout fuse into the new one.
5. Fix the top case and the removed legs and tighten the screws.

**NOTE :** Verify that the correct rating fuse is used.

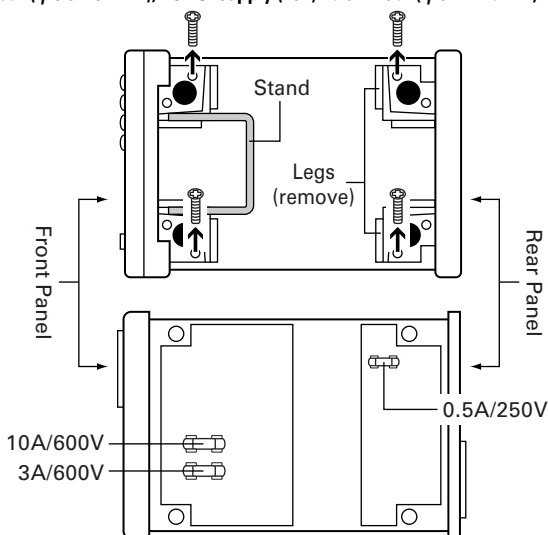


Fig. 14

### 2. $\mu\text{A}/\text{mA}$ Terminal Fuse ※0.5A/250V ( $\phi 5.2 \times 20\text{mm}$ )...F31

1. Detach test leads from measuring circuit and input terminals and disconnect AC Adapter from power source.
2. Press  $\mu\text{A}/\text{mA}$  terminal and turn it to the left.
3. Pull out the terminal with the blowout fuse inside.
4. Replace the blowout fuse into the new one. Turn the terminal to the right until it is locked.

**NOTE :** Use tweezers if the fuse is left in the front panel.

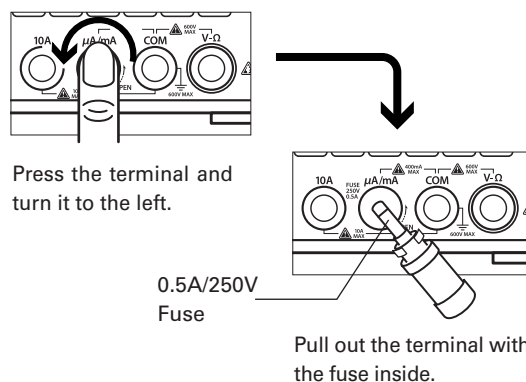


Fig. 15

## 7-2. 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.

## 7-3. 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 if the AC adapter is connected to the instrument and the outlet.
- Check if the fuses do not blow out or not drop off from the fuse holder.
- Confirm that the correct measurement function is selected.
- 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 and test leads have no cracks or any other damages.
- Check if the instrument is not affected by the strong noise generated from the equipment to be measured or measuring surroundings.

## WARRANTY

SK-4033/4035 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 SK-4033/4035 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.