

kaise

DIGITAL INSULATION TESTER

MODEL SK-3500
SK-3502

INSTRUCTION MANUAL




English : p. E-1~

日本語 : p. J-1~

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 Insulation Tester. WARNINGS with the symbol  on the Insulation Tester 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

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. For dangerous voltage measurement on High Power Line or High Voltage Circuit, always keep the instrument away from your body without holding it in your hands. Do not touch the insulation Tester, its Test Leads, and any part of the circuit.

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FOR SAFETY MEASUREMENTS

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INTRODUCTION

Thank you for purchasing KAISE "MODEL SK-3500/3502 DIGITAL INSULATION TESTER". To obtain the maximum performance of this instrument, read this Instruction Manual carefully, and take safe measurement.

1. FEATURES

4-rated SK-3500/3502 provides wide range of insulation measurement from low to high voltage circuit with live wire warning function. AC/DC voltage and low resistance is also measurable.

- High voltage characteristic even in low insulation resistance measurement point.
- IEC61557-4-compliant low resistance measurement function with maximum measurement current at 200mA.
- IP protection degree : IP40
- Improved usability by wide backlit LCD and functionally designed switches.
- Simple Dust-proof and water-resistant case to protect the instrument from dust and water damages.
- Comparator function : Buzzer sounds if measuring value exceeds or falls below the threshold.
- Data memory function : Memorize up to 100 data together with measured date and time.
- Timer function : 3-minutes continuous measurement is possible.
- Safety lock function : For safety measurement in 500V and 1000V ranges.
- Live wire warning function : Safety feature to prevent live wire measurement.

2. 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. Digital Insulation Tester	1 pce.
2. Test Lead (100-61)	1 set
3. Alligator Clip (black)	1 pce.
4. Carrying Case (1016)	1 pce.
5. Batteries (1.5V R6P)	8 pcs.
6. Instruction Manual	1 pce.

3. SPECIFICATIONS

3-1. GENERAL SPECIFICATIONS

1. DISPLAY (LCD)

a. **Numerical Display** : 4000 count, Maximum reading 4000, with bargraph

b. **Units and Symbols** : \sim , V, Ω , M Ω , BAT, DH, 0 Ω ADJ, MEMO, COMP, **HIGH**, **LOW**, , bargraph and decimal point.

2. **SAMPLING RATE** : 2 times / second

3. **RESPONSE TIME** : Insulation resistance ($\infty \rightarrow 0$, $\infty \rightarrow$ center value), Low resistance : within 5 seconds, Voltage : within 2 seconds

4. **OPERATABLE TEMPERATURE & HUMIDITY** : 0°C to 40°C, 90% RH or lower in non-condensing

5. **STORAGE TEMPERATURE & HUMIDITY** : -20°C to 50°C, 75%RH or lower in non-condensing

6. **OPERATABLE ENVIRONMENT** : Indoors, <2000m ASL

7. **TEMPERATURE COEFFICIENT** : 0 to 18°C, 28 to 40°C ; add $\pm 5\%rdg \pm 5dgt$ to accuracy

8. **IP PROTECTION DEGREE** : IP40

- 9. POWER SUPPLY** : 1.5V R6P or LR6(AA) batteries x 8
- 10. MAXIMUM RATED POWER** : 4.5VA (rated power in auto power save : 1mVA MAX)
- 11. OPERATABLE SUPPLY VOLTAGE** : 8.8V to 14.4V ("BAT" indication at 8.8V or less)
- 12. CONTINUOUS OPERATING TIME (with manganese cell)** :
Insulation resistance —∞ measurement ; [approx. 14 hours in 50V, approx. 14 hours in 125V, approx. 14 hours in 250V, approx. 12 hours in 500V, approx. 10 hours in 1000V (50V:SK-3500, 1000V:SK-3502)]
AC V : approx. 30 hours, Low resistance —∞ : approx. 13 hours.
- 13. NUMBER OF MEASUREMENT** :
- 1)Insulation Resistance —∞(ON for 5 seconds, OFF for 25 seconds) :
- 50V : manganese cell : more than 1800 times, alkaline cell : more than 5000 times (measure 0.05MΩ) ※SK-3500
- 125V : manganese cell : more than 1600 times, alkaline cell : more than 4500 times (measure 0.125MΩ)
- 250V : manganese cell : more than 1500 times, alkaline cell : more than 4000 times (measure 0.25MΩ)
- 500V : manganese cell : more than 1400 times, alkaline cell : more than 3500 times (measure 0.5MΩ)
- 1000V : manganese cell : more than 900 times, alkaline cell : more than 2500 times (measure 1MΩ) ※SK-3502
- 2)Low Resistance —1Ω (ON for 5 seconds, OFF for 25 seconds)
manganese cell : more than 700 times, alkaline cell : more than 2500 times
- 14. FUSE** : Fast-acting 0.5A/600V (φ 6.3 × 32mm) x 1
- 15. FUNCTION** : Comparator, Data memory, Timer, Live wire warning, High voltage warning, Safety lock, Automatic discharge, Zero-ohm adjustment, Backlight, Display hold, Auto power save
- 16. DIELECTRIC STRENGTH** : 6.88kV 50Hz sine wave for 1 minute (between circuit and chassis)
- 17. COMPLIANT STANDARD** : JIS C 1302:2002 (Insulation resistance)
- 18. SAFETY LEVEL** : CE Marking approved (IEC-61010-1, CAT IV 600V CLASS II and EMC Test passed.)
- 19. DIMENSIONS & WEIGHT** : 120(H) x 130(W) x 70(D)mm, Approx. 600g (Including batteries)

- 20. ACCESSORIES** : 100-61 Test Lead x 1 set, 945 Alligator Clip (black) x 1, 1016 Carrying Case, 1.5V R6P(AAA) batteries x 8, Spare fuse (0.5A/600V) × 1 (built-in), Instruction Manual
- 21. OPTIONAL ACCESSORIES** : 766 Black Test Prod (with 767 Test Pin), 940 Red Alligator Clip

3-2. MEASUREMENT SPECIFICATIONS

(Accuracy guaranteed condition : $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
 $< 75\% \text{RH}$ in non-condensing)

1. Insulation Resistance Measurement

(50V : SK-3500 only, 1000V : SK-3502 only)

1-1. Rated Test Voltage and Maximum Effective Reading

SK-3500

Rated Test Voltage (DC)	Max. Effective Reading	Center Reading
50V / 125V	200M Ω	5M Ω
250V / 500V	2000M Ω	50M Ω

SK-3502

Rated Test Voltage (DC)	Max. Effective Reading	Center Reading
125V	200M Ω	5M Ω
250V / 500V / 1000V	2000M Ω	50M Ω

1-2. Display Range

Rated Test Voltage	Display Range (Auto-ranging)	Resolution
50V / 125V / 250V 500V / 1000V	4.000M Ω	0.001M Ω
	40.00M Ω	0.01M Ω
50V / 125V	200.0M Ω	0.1M Ω
250V / 500V / 1000V	400.0M Ω	0.1M Ω
	2000M Ω	1M Ω

1-3. Rated Measurement Range and Accuracy

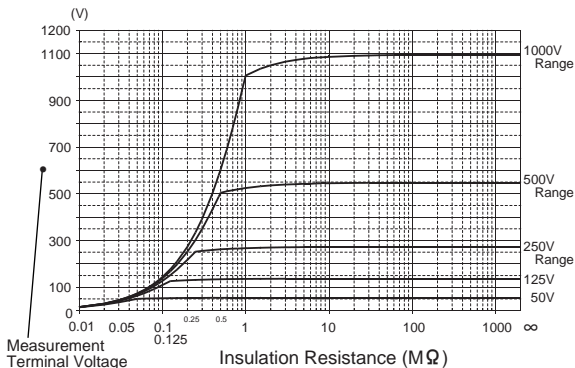
Rated Test Voltage	Name of Measurement Range	Measurement Range	Accuracy
50V / 125V	1st effective range	0.200 to 10M Ω	$\pm 3\%rdg \pm 4dgt$
	2nd effective range	0 to 0.199M Ω 10.01 to 200.0M Ω	$\pm 5\%rdg \pm 5dgt$
250V / 500V / 1000V	1st effective range	0.200 to 100M Ω	$\pm 3\%rdg \pm 4dgt$
	2nd effective range	0 to 0.199M Ω 100.1 to 2000M Ω	$\pm 5\%rdg \pm 5dgt$

1-4. Measurement Terminal Voltage Characteristic

Rated Test Voltage	Tolerance of Measurement Circuit Terminal Voltage	Minimum Resistance Measurement Values to Maintain Rated Test Voltage	Rated Test Current
50V	1 to 1.2 times of Rated Test Voltage	0.05M Ω	1 to 1.2mA
125V		0.125M Ω	
250V		0.25M Ω	
500V		0.5M Ω	
1000V		1M Ω	

Short Circuit Current : 2mA or less

SK-3500/3502 Measurement Terminal Voltage Characteristic



2. Low Resistance Measurement

2-1. Display Range and Accuracy

Display Range (Auto-ranging)	Resolution	Accuracy (After 0Ω Adjustment)	Measurement Current
20.00 Ω	0.01 Ω	±3%rdg±5dgt	200mA or more
400.0 Ω	0.1 Ω		Approx. 10mA

Open Circuit Voltage : 6V or more

Overload Protection : by 0.5A / 600V fuse

3. AC/DC Voltage Measurement

3-1. Display Range and Accuracy

Range		Resolution	Accuracy	Input Resistance
DCV/ACV fixed	0V to 600V	1V	±3%rdg±5dgt	Approx. 660k Ω
AUTO	10V to 600V			

Max. Input Voltage : 600V rms

Overload Protection : 900V rms (for 1 minute)

4. 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.

4-1. 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. Warning for High Power Line Measurements

High Power Line (High Energy Circuits) such as Distribution Transformers, Bus Bars and Large Motors are very dangerous. High Power Line sometimes includes High Surge Voltage that could cause explosive short in the instrument and could result in shock hazard. For voltage measurement of High Power Line, do not touch Insulation Tester, its Test Leads, and any part of the circuit.



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 Insulation Tester, Test Leads, and any part of the circuit. Generally, shock hazard could occur then 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 Procedure

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

- Do not hold Insulation Tester and test leads in your hands. Keep safety distance from power source or circuit to be measured not to touch the dangerous voltage.
- Black test lead : Attach black alligator clip.
- Red test lead : Attach red alligator clip to test lead pin.
- Turn off the power of the circuit to be measured when connecting test leads.
- After measurement, before detaching alligator clips (test leads), turn the circuit power off and discharge the all capacitors.

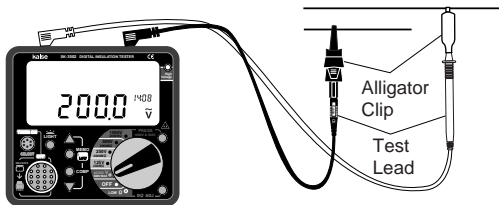


fig. 1

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

- Do not hold Insulation Tester in your hands. Keep safety distance from power source or 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 : Hold with one hand and connect to + (positive) side of the circuit.

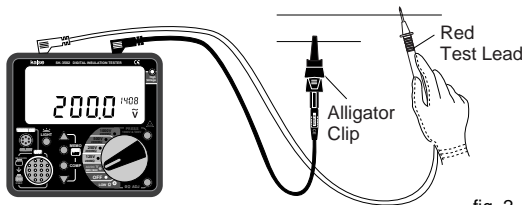


fig. 2

! WARNING 5. Correct Selection of FUNCTION Switch

Always confirm that FUNCTION Switch is set to the correct position. Do not measure voltage except for AC/DC V position.

! WARNING 6. Maximum Input Observance

Do not measure voltage or current that exceed the specified maximum input values.

! WARNING 7. Test Lead Detachment

Detach test leads from measuring circuit before switching measurement functions or removing battery cover for battery and fuse replacement.

4-2. 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 benzene. If necessary, use silicon oil or antistatic fluid.
- CAUTION 2.** Avoid the Insulation Tester from hard mechanical shock or vibration, high temperature and strong magnetic field.
- CAUTION 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.

5. NAME ILLUSTRATION

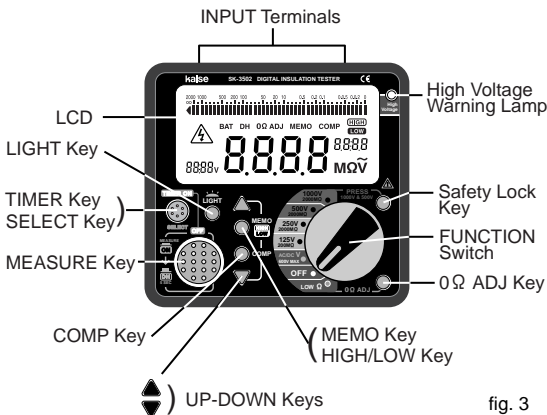
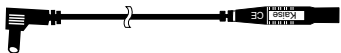


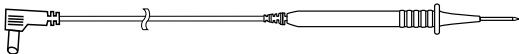
fig. 3

Black EARTH Test Lead



Alligator Clip

Red LINE Test Lead



- Attach alligator clip to Black Earth Test Lead.

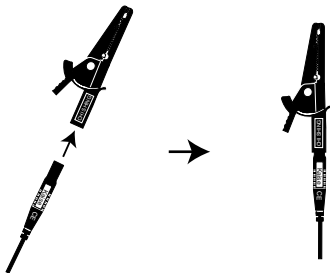
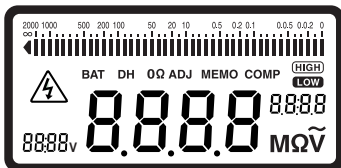


fig. 4

5-1. LCD



- MΩ : Lights up in insulation resistance measurement
- Ω : Lights up in low resistance measurement
- V : Lights up in voltage measurement
- ~ : Lights up in AC voltage measurement
- ⚡ : Lights up or blinks at high voltage input and output
- BAT : Low battery warning
- DH : Lights up while holding LCD indications
- 0Ω ADJ : Lights up in zero-ohm adjustment
- MEMO : Lights up in data memory function
- COMP : Lights up in comparator function
- HIGH** : Lights up if measuring value exceeds a threshold
- LOW** : Lights up if measuring value falls below a threshold

5-2. FUNCTION Switch

Turns the power on and selects measurement functions. After measurement, turn it to "OFF".

5-3. MEASURE Key

Insulation Resistance and Low Resistance Measurements :

Hold down this key to start measurement and release it to stop measurement. Displayed values are held automatically for 5 seconds ("DH" lights up).

Voltage Measurement : Press this key while measurement to hold LCD indications ("DH" lights up). To cancel display hold, press this key again.

5-4. TIMER Key : Timer Function (Continuous Measurement)

Press this key for 3-minutes continuous measurement. Usable in Insulation Resistance Measurement and Low Resistance Measurement.

To cancel it : Press **MEASURE** Key during continuous measurement.

5-5. SELECT Key :

Press this key to switch year, date and time display while viewing memorized data.

5-6. Safety Lock Key : Safety Lock Function

The key to protect the operator from high voltage accidents. To select 500V or 1000V range, turn **FUNCTION** Switch holding down this key.

5-7. 0Ω ADJ Key : Zero-ohm Adjustment

Usable in Low Resistance Measurement. LCD indication is adjustable into zero by pressing this key with test leads shorted. ("0Ω ADJ" lights up)

5-8. LIGHT Key : Backlight

Turns on and off the LCD backlight. The light automatically turned off after 30 seconds.

5-9. COMP Key : Comparator Function

Activates Comparator Function in Insulation Resistance Measurement and Low Resistance Measurement. For details, refer to 「7-1. Comparator Function」 .

5-10. MEMO Key : Data Memory Function

Press this key to memorize measuring data in Insulation Resistance Measurement and Low Resistance Measurement or to view memorized data. For details, refer to 「7-2. Data Memory Function」 .

5-11. HIGH / LOW Key

Usable in Comparator Function to set buzzer timing.

5-12. UP-DOWN Keys

Usable for various settings such as to set threshold in Comparator Function or to set memory number in Data Memory Function.

5-13. High Voltage Warning Lamp

Lights up during insulation resistance and Low Resistance measurements to indicate high voltage generation.

5-14. Input Terminals · Test Leads

Set up EARTH Test Lead (black) as shown in fig. 3. Plug black EARTH test lead into EARTH terminal, and red LINE test lead into LINE terminal.

6. MEASUREMENT PROCEDURES

6-1. PREPARATION FOR USE

1. INSTRUCTION MANUAL

Read INSTRUCTION MANUAL carefully to understand the specification and functions correctly. 「4. SAFETY PRECAUTIONS」 is highly important for safety measurement.

2. BATTERY

Before using this instrument, install batteries referring to 「8. BATTERY AND FUSE REPLACEMENT」. Replace them in the same way when "BAT" lights up on LCD.

3. FUSE

0.5A/600V(ϕ 6.3x32mm) fuse is used. One spare fuse is included inside battery cover.

Fuse Testing : Plug test leads into input terminals and set **FUNCTION** Switch to "LOW Ω ". If "OL" remains indicated under measurement after shorting test lead, fuse blowout or test lead disconnection may occur. (For detailed measurement method, refer to 「6-3. Low Resistance Measurement (Ω)」)

4. BUILT-IN CLOCK SETTINGS

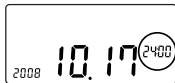
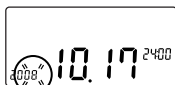
To memorize date and time of measuring data in Data Memory Function, set built-in clock in the following procedures. (For the function details, refer to 「7-2. Data Memory Function」).

● Setting Procedures :

- ① Set **FUNCTION** Switch from "OFF" to "LOW Ω" holding down **UP-DOWN** Keys together. Keep the keys holding down until setting items (year, month, date, hour: minute) are indicated on LCD.

NOTE : To reset clock settings into "2008 01.01 00:00", press **0** Ω **ADJ** Key after ①.






- ② Press **MEMO** Key. Set last 2 digits of "year" (blinking) by **UP-DOWN** Keys.
- ③ Press **MEMO** Key again. Set "month" (blinking) by **UP-DOWN** Keys.
- ④ Repeat ② and ③ and set the all items until "minute". To return to the last item, press **COMP** Key.
- ⑤ When the setting is done, press **MEASURE** Key. Setup date and time are displayed.
- ⑥ Turn the power off to finish clock settings.



NOTE : Built-in clock is powered by internal lithium battery. Time settings will be incorrect when it is exhausted. For replacement, ask **KAISE AUTHORIZED SERVICE AGENCY** or the manufacturer, **KAISE CORPORATION**.

5. SYMBOL MARK

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

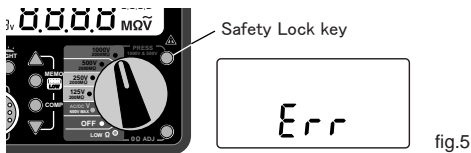
	Caution (refer to instruction manual.)
	Dangerous voltage is applied to this terminal.
	Alternating Current (AC)
	Double Insulation
	CE Marking Conformity

6-2. INSULATION RESISTANCE MEASUREMENT (MΩ)

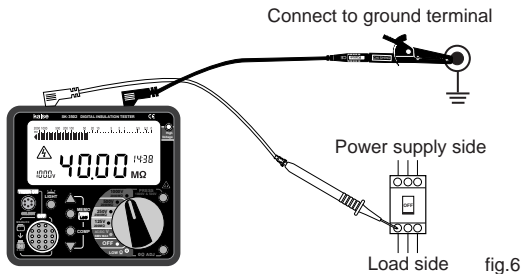
WARNINGS

- Do not measure live-wire insulation resistance to avoid serious damage to the instrument and electric shock hazard. Before starting measurement, turn off the power to the circuit to be measured without fail.
- Dangerous high voltage is applied to the measurement terminals when measuring insulation resistance. To avoid electric shock hazard, do not touch test lead pins or the other metal parts, and circuit or object being measured.
- To avoid electric shock hazard, do not touch measured circuit or object after measurement without discharging them. For details, see "**Automatic Discharge Function**" mentioned below.
- Read 「4. SAFETY PRECAUTIONS」 carefully to avoid electric shock hazard and serious damage to the instrument.

1. Plug black EARTH test lead into EARTH terminal, and red LINE test lead into LINE terminal.
 2. Set **FUNCTION** Switch to the suitable insulation measurement function.
 SK-3500 : 50V / 125V / 250V / 500V
 SK-3502 : 125V / 250V / 500V / 1000V
- **To select 500V or 1000V** (High voltage warning function) :
 Set **FUNCTION** Switch holding down **Safety Lock Key**. If they are selected without pressing **Safety Lock Key**, LCD indicates "Err" to prevent the measurement.



3. Selected rated voltage, " - - - MΩ " and time are indicated on LCD. Use **DOWN** Key (∇) to change the time indication into year and date indications.
4. Connect an alligator clip on black EARTH test lead to the ground side of the object to be measured. As for the measurement of nongrounded object, connect it to optional part.
5. Connect red LINE test lead to the object to be measured.
⚠ WARNING : If connected to live-wired object that has over 10V, ⚡ and bargraph flashes to prevent dangerous measurement. Turn off the power of the object to be measured. (Live wire warning function).



⚠ Warning

Be sure to turn off the breaker of the circuit to be measured.

● **Measurement by Pressing MEASURE Key**

1. Press **MEASURE** Key. High Voltage Warning Lamp and ⚡ on LCD light up. Keep it holding down during measurement.
2. Read the measurement value on LCD.
3. Release **MEASURE** Key to stop measurement. Displayed values are held automatically for 5 seconds ("DH" lights up).
4. Discharge the measured object in the following "**Automatic Discharge Function**" procedures.
5. Detach test leads and set **FUNCTION** Switch to "**OFF**".

Supporting Functions : Comparator Function, Data Memory Function, Backlight, Auto Power Save (Refer to 5-8 and 7-1 to 7-3)

● **Continuous Measurement**

1. Press **TIMER** Key. High Voltage Warning Lamp and ⚡ on LCD light up, and starts 3-minutes continuous measurement.
 ⚠ **WARNING** : Dangerous high voltage is continuously applied to test lead pins. Pay careful attention not to get an electric shock.
2. Read the measurement value on LCD.


3. Press **MEASURE** Key to stop continuous measurement. Displayed values are held automatically for 5 seconds ("DH" lights up).
 4. Discharge the measured object in the following "**Automatic Discharge Function**" procedures.
 5. Detach test leads and set **FUNCTION** Switch to "**OFF**".
- Supporting Functions** : Comparator Function, Data Memory Function, Backlight, Auto Power Save (Refer to 5-8 and 7-1 to 7-3)

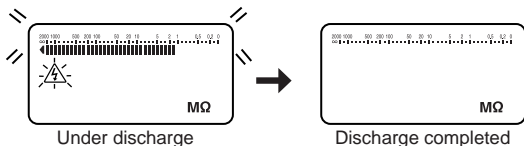
NOTES

- Measurement value might be unstable depending on the object to be measured.
- Connect EARTH terminal (+ polarity) to the ground side of the object to be measured if it is grounded. Measurement value can be lower under this connection that is suitable for circuit measurement. Pay attention to lead wires connected to LINE terminal (- polarity) not to touch the ground or any other object. When measuring over $2000\text{M}\Omega$ under 250V/500V/1000V
- ranges, or measuring over $200\text{M}\Omega$ under 50V/125V ranges, LCD can display up to $2500\text{M}\Omega$ or $250\text{M}\Omega$ each, but memorized data should be "OL".

● AUTOMATIC DISCHARGE FUNCTION

After insulation resistance measurement, electricity is charged to the measured object. To avoid electrical shock hazard, discharge them in the following procedures.

1. Stop measurement without detaching red and black test leads from the measured object.
2. The function starts the discharge automatically. Wait until it is completed.
3.  and bargraph flashes during the discharge. The number of bargraph shows discharge level.
4. Detach test leads from the measured object after stop flashing and bargraph is disappeared.



6-3. Low Resistance Measurement (Ω)

WARNINGS



- Do not measure voltage in Low Resistance Measurement function to avoid electric shock hazard and serious damage to the instrument.
- Before measurement, to avoid electric shock hazard, turn off the power of the circuit to be measured and discharge the all capacitors.
- Read 「4. SAFETY PRECAUTIONS」 carefully to avoid electric shock hazard and serious damage to the instrument.

1. Plug black EARTH test lead into EARTH terminal, and red LINE test lead into LINE terminal.
2. Set **FUNCTION** Switch to "**LOW** Ω ". "- - - - Ω " and time are indicated on LCD. Use **DOWN** Key (∇) to change the time indication into year and date indications.
3. Measurement range is selectable among "AUTO", "20.00 Ω range", and "400.0 Ω range" by **UP** Key (Δ). Default setting is "AUTO".

AUTO : "- - - - Ω " or "**Auto** Ω " indications
20.00 Ω range : "- - - - Ω " indication
 (Confirm by decimal point.)
400.0 Ω range : "- - - - Ω " indication
 (Confirm by decimal point.)

4. Adjust ZERO in the following "**Zero-ohm Adjustment Function**" procedures.

5. Connect test leads to the object to be measured.

 **WARNING** : If connected to live-wired object that has over 10V,  and bargraph flashes to prevent dangerous measurement. Turn off the power of the object to be measured. (Live wire warning function).

● Measurement by Pressing MEASURE Key

1. Press **MEASURE** Key. High Voltage Warning Lamp lights up. Keep it holding down during measurement.
2. Read the measurement value on LCD. Buzzer sounds at 10Ω or less if Comparator Function is not used.
3. Release **MEASURE** Key to stop measurement. Displayed values are held automatically for 5 seconds ("DH" lights up).
4. Detach test leads and set **FUNCTION** Switch to "OFF".

Supporting Functions : Comparator Function, Data Memory Function, Backlight, Auto Power Save (Refer to 5-8 and 7-1 to 7-3)

● Continuous Measurement

1. Press **TIMER** Key. High Voltage Warning Lamp lights up, and starts 3-minutes continuous measurement. Buzzer sounds at 10Ω or less if Comparator Function is not used.
2. Read the measurement value on LCD.
3. Press **MEASURE** Key to stop continuous measurement. Displayed values are held automatically for 5 seconds ("DH" lights up).
4. Detach test leads and set **FUNCTION** Switch to "OFF".

Supporting Functions : Comparator Function, Data Memory Function, Backlight, Auto Power Save (Refer to 5-8 and 7-1 to 7-3)

● ZERO-OHM ADJUSTMENT FUNCTION

This function cancels resistance of test leads and fuse to display actual resistance value of the object being measured.

1. Plug red and black test leads to input terminals, and set **FUNCTION** Switch to "LOW Ω".
2. Short-circuit metal pins of the test leads and press **MEASURE** Key.
3. Press **0Ω ADJ** Key after LCD indications become stable. Confirm "**0.000Ω**" is indicated on LCD. ("**0Ω ADJ**" lights up)

NOTES

- Zero Adjustment Function is effective when indicating value is 10Ω or less. If 0Ω **ADJ** Key is pressed over 10Ω , "Err" is indicated.
- If "OL" remains indicated under measurement after shorting test lead, fuse blowout or test lead disconnection may occur.
- Measurement stops automatically after 30 minutes of continuous measurement for 20Ω or lower.

6-4. AC/DC VOLTAGE MEASUREMENT (V)

WARNINGS

- Do not measure any voltage that might exceed maximum input value (600V AC/DC).
- Always connect test leads to secondary side of a breaker. Connection to primary side may cause electric shock hazard.
- To avoid electric shock hazard, pay attention not to short-circuit live wire with test lead pins.
- Read 「4. SAFETY PRECAUTIONS」 carefully to avoid electric shock hazard and serious damage to the instrument.

1. Plug black EARTH test lead into EARTH terminal, and red LINE test lead into LINE terminal.
2. Set **FUNCTION** Switch to "**AC/DC V**". "Auto V" and time are indicated on LCD. Use **DOWN** Key (∇) to change the time indication into year and date indications.
3. Measurement range is selectable among "AUTO", "DCV", and "ACV" by **UP** Key (Δ). Default setting is "AUTO".

AUTO ("Auto V" indication) :

10V to 600V AC/DC is measurable. AC or DC are selected automatically.

NOTE : No DC (---) indication.

DCV fixed ("V" lights up) : 0V to 600V DC is measurable.

NOTE : No DC (---) indication.

ACV fixed (" \tilde{V} " lights up) : 0V to 600V AC is measurable.

4. Connect black alligator clip to (–) earth side and red test lead to (+) side of the circuit to be measured.

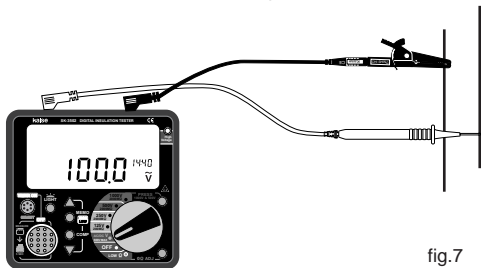
NOTE : Connect insulation tester **IN PARALLEL** to the circuit.

5. Read the measurement value on LCD.
6. After measurement, set **FUNCTION** Switch to "**OFF**".

Supporting Functions : Display Hold, Backlight, Auto Power Save (Refer to 5-3, 5-8 and 7-3)

NOTES

- Warning buzzer sounds when measuring 601V or more.
- "OL" is indicated when measuring 1000V or more.



7. FUNCTIONS

7-1. COMPARATOR FUNCTION

(effective for Insulation Resistance Measurement and Low Resistance Measurement)

Buzzer sounds and **HIGH** or **LOW** flashes if measuring value exceeds or falls below the threshold.

● Setting Procedure in Insulation Resistance Measurement

1. Set **FUNCTION** Switch to Insulation Resistance Measurement function.
2. Press **COMP** Key. "**COMP**" lights up and enter comparator setting mode. Threshold and **(HIGH)** or **(LOW)** blink in the right part of LCD.
3. Press **UP-DOWN** Keys and select suitable threshold from the following table.

FUNCTION	Selectable Threshold Value
50V / 125V	0.1/0.2/0.3/0.4/0.5/1/2/3/5/10/20/30/50/ 100/200M Ω
250V / 500V / 1000V	0.1/0.2/0.3/0.4/0.5/1/2/3/5/10/20/30/50/100/ 200/500/1000/2000M Ω

※50V : SK-3500 only, 1000V : SK-3502 only

4. Set buzzer timing. Press **High / LOW** Key and select either **(HIGH)** or **(LOW)**.

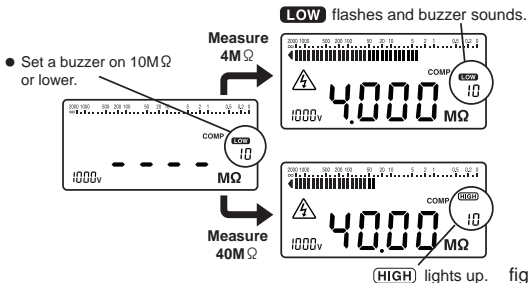
(HIGH): Buzzer sounds if measuring value exceeds a threshold with flashing **(HIGH)**. If it is lower than threshold, indicates **(LOW)**.

(LOW): Buzzer sounds if measuring value falls below a threshold with flashing **(LOW)**. If it is higher than threshold, indicates **(HIGH)**.

5. Press **COMP** Key to finish comparator settings.
6. Press **MEASURE** Key or **TIMER** Key to start Comparator Measurement. Buzzer sounds according to the setup condition.

● Setting Example : Refer to fig.8.

- 1) Set comparator to sound a buzzer at 10M Ω or lower.
- 2) When measuring value is 4M Ω , **(LOW)** flashes and buzzer sounds.
- 3) When measuring value is 40M Ω , **(HIGH)** lights up.



● Setting Procedure in LOW Resistance Measurement

1. Set **FUNCTION** Switch to "LOW Ω".
2. Press **COMP** Key. "COMP" lights up and enter comparator setting mode. Threshold and (HIGH) or (LOW) blink in the right part of LCD.
3. Press **UP-DOWN** Keys and select suitable threshold from the following table.

FUNCTION	Selectable Threshold Value
LOW Ω	0.5/1/2/3/4/5/10/20/30/50/100/200 Ω

NOTE : Cannot select 30 Ω or higher if measurement range is fixed at 20.00 Ω.

4. Set buzzer timing. Press High / Low Key and select either (HIGH) or (LOW). (Refer to P.25-4 for details.)
5. Press **COMP** Key to finish comparator settings.
6. Press **MEASURE** Key or **TIMER** Key to start Comparator Measurement. Buzzer sounds according to the setup condition.

● **To Cancel Comparator Function** : Press **COMP** Key for 1 second or more ("COMP" disappears).

7-2. DATA MEMORY FUNCTION

(effective for Insulation Resistance Measurement and Low Resistance Measurement)

Up to 100 data can be memorized together with their measured date and time.

● Data Memorize Procedure

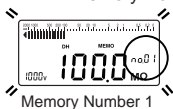
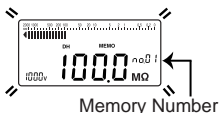
1. Press **MEMO** Key during 5-seconds display hold after Insulation Resistance or Low Resistance Measurement. ("**MEMO**" lights up).

2. LCD indications and Memory Number blinks.

3. Memory Number is selectable by **UP-DOWN** Keys.

If the selected number is already used, the memorized data is displayed.

4. Press **MEMO** Key for 1 second or more to memorize a data in the selected Memory Number. Memorized items are "measurement value", "rated voltage" and "measured date and time".



↓ Press UP Key



NOTES

- The previously memorized data is deleted if a new data is overwritten in the same Memory Number.
- In Insulation Resistance Measurement, when measuring over 2000MΩ under 250V/500V/1000V ranges, or measuring over 200MΩ under 50V/125V ranges, LCD can display up to 2500MΩ or 250MΩ each, but memorized data should be "OL".



● View the Memorized Data

1. Set **FUNCTION** Switch to Insulation Resistance Measurement function or "**LOW** Ω", and press **MEMO** Key. ("**MEMO**" lights up)
2. Memorized data is displayed together with its Memory Number. Use **UP-DOWN** Keys to scroll the display.
3. Use **SELECT** Key to display measured date and time. Rated voltage in the bottom-left corner of LCD switches into "time" → "date" → "year" as pressing **SELECT** Key.

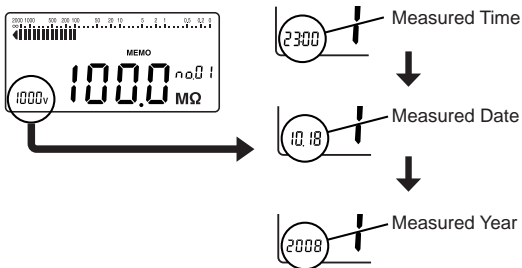


fig.9

● Delete All of the Memorized Data

1. Set **FUNCTION** Switch from "**OFF**" to "**AC/DC V**" holding down **UP-DOWN** Keys together.
2. Start to delete the data.
3. Buzzer sounds when all of the memorized data is deleted.
4. Set **FUNCTION** Switch to "**OFF**" before restarting the measurement.

7-3. AUTO POWER SAVE

(Effective for the all measurement functions)

Power turns off automatically after approx. 15 minutes of last switch operation to conserve battery life. (Small current consumption remains. After measurement, always set **FUNCTION** Switch to "OFF".)

8. BATTERY AND FUSE REPLACEMENT

WARNINGS

- To avoid electrical shock, detach instrument and test lead from circuit when to replace batteries and fuse. Set **FUNCTION** Switch to "OFF".
- After replacing batteries and fuse, be sure to tighten the screws of battery cover.
- Always use the specified fuse. Do not use the instrument shorting fuse holder or without using the fuse.
Fuse type : Fast-acting 0.5A/600V (ϕ 6.3x32mm)

Replace the batteries and fuse when "BAT" lights up on LCD or fuse blows out.

1. Turn the power off and detach test leads from the circuit.
2. Take the carrying case off. For easy taking off, insert your fingers into test plug slots behind input terminals, and lift up the instrument.
3. Unscrew Battery Cover and remove exhausted batteries.
4. Insert 8 of new 1.5V R6P (AA) batteries in correct polarity.
5. Fuse : Replace a blownout fuse into a new one.
(One spare fuse is included inside battery cover.)
6. Fix Battery Cover and tighten the screw.

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.

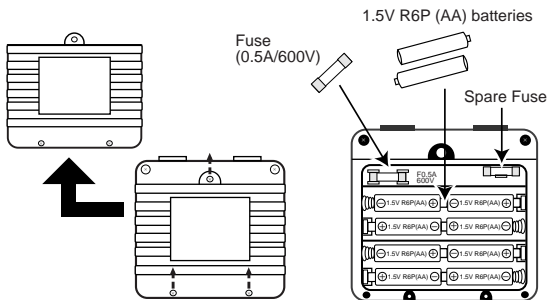


fig.10

9. CARRYING CASE USAGE

1. Easy storage of carrying case cover when taking measurement.

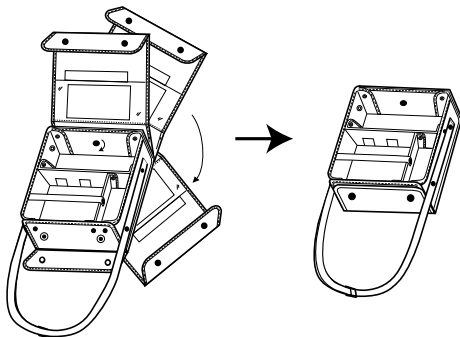


fig.11

2. Safe and stable hands-free measurement is possible by wearing shoulder strap around your neck with releasing a side snap as shown in fig.12.

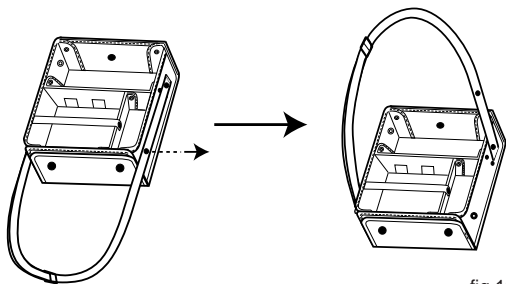


fig.12

● Sample pictures



10. MAINTENANCE

10-1. 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.

10-2. 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 ("BAT" lights up or not).
2. Confirm that FUNCTION 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

SK-3500/3502 are warranted in their 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-3500/3502 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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<http://www.kaise.com>

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