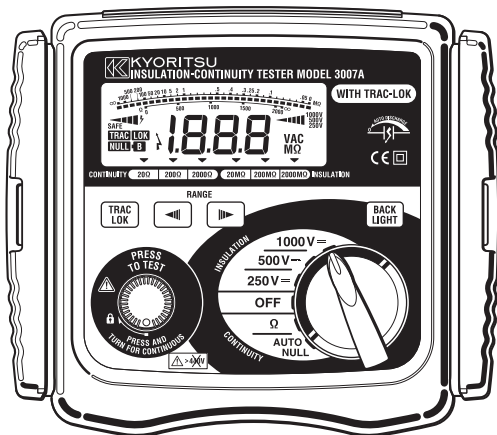


INSTRUCTION MANUAL



DIGITAL INSULATION/CONTINUITY TESTER

MODEL 3005A / 3007A

**KYORITSU ELECTRICAL INSTRUMENTS
WORKS, LTD., TOKYO JAPAN**

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1. SAFETY WARNINGS




This instrument has been designed, manufactured and tested according to IEC 61010: Safety requirements for Electronic measuring apparatus, and delivered in the best condition after passed the inspection. This instruction manual contains warnings and safety rules which must be observed by the user to ensure safe operation of the instrument and retain it in safe condition. Therefore, read through these operating instructions before using the instrument.

WARNING








- Read through and understand the instructions contained in this manual before using the instrument.
- Save and keep the manual handy to enable quick reference whenever necessary.
- The instrument is to be used only in its intended applications.
- Understand and follow all the safety instructions contained in the manual.

Failure to follow the instructions may cause injury, instrument damage and/or damage to equipment under test. Kyoritsu is by no means liable for any damage resulting from the instrument in contradiction to this cautionary note.

The symbol  indicated on the instrument, means that the user must refer to the related parts in the manual for safe operation of the instrument. It is essential to read the instructions wherever the symbol appears in the manual.

-  **DANGER** is reserved for conditions and actions that are likely to cause serious or fatal injury.
-  **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.
-  **CAUTION** is reserved for conditions and actions that can cause injury or instrument damage.

Please refer to following explanation of the symbols used on the instrument and in this manual.

	Refer to the instructions in the manual. This symbol is marked where the user must refer to the instruction manual so as not to cause personal injury or instrument damage.
	Danger of possible electric shock
	Indicates an instrument with double or reinforced insulation.
	Protection against wrong connection is up to 440V
	Earth Ground
	Crossed-out wheel bin symbol (according to WEEE Directive: 2002/96/EC) indicating that this electrical product may not be treated as household waste, but that it must be collected and treated separately.
	This marking means they shall be sorted out and collected as ordained in DIRECTIVE 2006/66/EC. This directive is valid only in the EU. When you remove batteries from this product and dispose them, discard them in accordance with domestic law concerning disposal. Take a right action on waste batteries, because the collection system in the EU on waste batteries are regulated.

 **DANGER**

- Never make measurement on the circuit in which electrical potential to ground over 300V exists.
- Be careful not to short-circuit the power line with the metal part of the test leads when measuring voltage. It may cause personal injury.
- Do not attempt to make measurement in the presence of flammable gasses. Otherwise, the use of the instrument may cause sparking, which can lead to an explosion.
- Verify proper operation on a known source before use or taking action as a result indication of the instrument.
- Never attempt to use the instrument if its surface or your hand is wet.
- Never open the battery compartment cover and the instrument case when making a measurement.
- Do not exceed the maximum allowable input of measuring ranges.
- The instrument should be used only in its intended applications or conditions. Otherwise, safety functions equipped with the instrument do not work, and instrument damage or serious personal injury may be caused.

⚠ WARNING

- Never attempt to make any measurement, if the instrument has any structural abnormality such as cracked case or exposed metal parts.
- Stop using the test lead if the outer jacket is damaged and the inner metal or color jacket is exposed.
- Do not install substitute parts or perform any unauthorized modification of the instrument. Return the instrument to Kyoritsu or your distributor for service and repair to ensure the safety features are maintained.
- Do not turn the function selector switch with plugged in test leads connected to the circuit under test.
- Ensure that the instrument is powered off when opening the battery compartment cover for battery replacement.
- Ensure that the Test Lead is disconnected from the object under test, and that the instrument is powered off when opening the battery compartment cover for battery or fuse replacement.

⚠ CAUTION

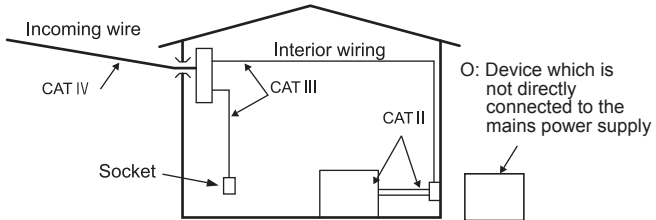
- Always make sure to insert each plug of the test leads fully into the appropriate terminal on the instrument.
- Do not expose the instrument to the direct sun, dew fall or extreme temperature and humidity.
- Be sure to set the Function Switch to the "OFF" position after use. When the instrument will not be used for a long period of time, place it in storage after removing the batteries.
- Use a damp cloth and detergent for cleaning the instrument. Do not use abrasives or solvents.
- Keep your fingers and hands behind the protective finguard during measurement.

Measurement categories (Over-voltage categories)

To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as O to CAT IV, and called measurement categories.

Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II.

- O : Circuits which are not directly connected to the mains power supply.
- CAT II : Primary electrical circuits of equipment connected to an AC electrical outlet by a power cord.
- CAT III : Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.
- CAT IV : The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).



2. FEATURES

MODEL-3005A/3007A are microprocessor controlled insulation-continuity testers.

- Designed to safety standards:
 - IEC 61010-1, 61010-2-030 Measurement CAT III 300V Pollution Degree 2
 - IEC 61010-031
 - IEC 61557-1,2,4,10

- Display with back light function to facilitate work at night or dimly lit locations (Model 3007A only)

- Bar graph to indicate measured results

- Strap belt to make both hands' operation easier

- Live circuit warning indication and buzzer

- Auto discharge function
When insulation resistance is measured, electric charges stored in capacitive circuits are automatically discharged after testing. Discharge can be checked with live circuit warning.

- Auto power off function
To prevent the instrument from being left powered on and conserve battery power, the instrument automatically turns off approx. 10 minutes after the last switch operation.

- LOK mode (Model 3007A only)
The test current is removed once a stable reading is reached to prevent unnecessary battery consumption.

3. SPECIFICATIONS

● Measuring Range and Accuracy (at 23±5°C, relative humidity 45 -75%)

○ Insulation Resistance Ranges:

Nominal Output Voltage		250V	500V	1000V
Measuring Ranges		0 ~ 19.99MΩ	0 ~ 19.99MΩ	0 ~ 19.99MΩ
		0 ~ 199.9MΩ	0 ~ 199.9MΩ	0 ~ 199.9MΩ
		0 ~ 1999MΩ	0 ~ 1999MΩ	0 ~ 1999MΩ
Open-Circuit Voltage		250V DC +20%,-0%	500V DC +20%,-0%	1000V DC +20%,-0%
Nominal Current		1mA DC min. at 0.25MΩ	1mA DC min. at 0.5MΩ	1mA DC min. at 1MΩ
Short - Circuit Current		1.5mA approx		
Accuracy	20MΩ 200MΩ	±1.5%rdg ±5dgt		
	2000MΩ	0~1GΩ 1G~2GΩ	±10%rdg ±3dgt	±3%rdg ±3dgt

○ Continuity Ranges:

Ranges	20Ω	200Ω	2000Ω
Measuring Ranges	0 ~ 19.99Ω	0 ~ 199.9Ω	0 ~ 1999Ω
Open - Circuit Voltage	7 ~ 12V approx.		
Measuring Current at 0.2Ω ~ 2Ω	200mA min.		
Accuracy	±1.5%rdg ±5dgt	±1.5%rdg ±3dgt	

○ AC Voltage Indication
0 ~ 600V

±5%rdg ±3dgt

- Typical Number of Measurements.
(central tendency for supply voltage up to 8V)
Insulation Resistance Ranges:
Approx. 1000 times min. at load 0.5M Ω
Continuity Ranges:
Approx. 700 times min. at load 1 Ω

- Operating instrumental uncertainty (IEC 61557-2,-4)

Functions	Range	Measuring range to keep operating instrumental uncertainty	Maximum percentage operating instrumental uncertainty
1000V	20M Ω	0.50 ~ 19.99M Ω	$\pm 30\%$
	200M Ω	1.0 ~ 199.9M Ω	
	2000M Ω	10 ~ 1000M Ω	
500V	20M Ω	0.50 ~ 19.99M Ω	
	200M Ω	1.0 ~ 199.9M Ω	
	2000M Ω	10 ~ 100M Ω	
250V	20M Ω	0.25 ~ 19.99M Ω	
	200M Ω	1.0 ~ 199.9M Ω	
	2000M Ω	10 ~ 100M Ω	
Ω	20 Ω	0.20 ~ 19.99 Ω	
	200 Ω	1.0 ~ 199.9 Ω	
	2000 Ω	10 ~ 1999 Ω	

The influencing variations used for calculating the operating instrumental uncertainty are denoted as follows;

Temperature: 0 $^{\circ}$ C and 35 $^{\circ}$ C

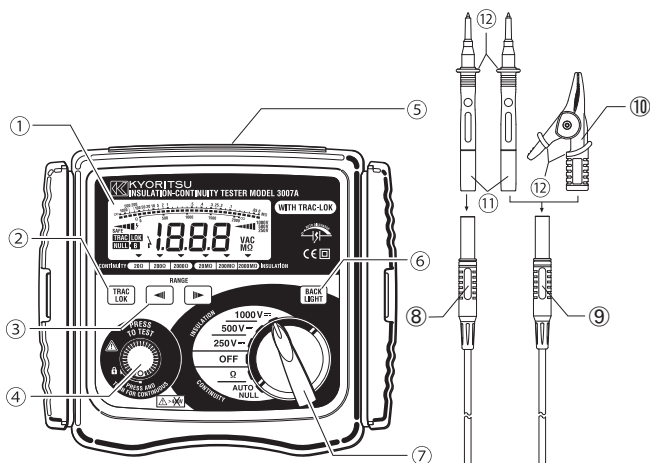
Supply voltage: 8V to 13.8V

- Applicable Standards
 - IEC 61010-1, 61010-2-030 Measurement CAT III 300V Pollution Degree 2
 - IEC 61010-031 Safety requirements for hand-held probe assemblies
 - IEC 61557-1,2,4,10 Measuring equipment for low voltage distribution systems
 - IEC 61326-2-2 EMC
 - IEC 60529 (IP54) Dust & drip proof
 - IEC 50581 RoHS
- Operating System: Dual integration

- Display: Liquid crystal display (maximum count: 1999), Unit, Mark
Bar graph 30 points max. (20 points on Ω range)
- Over range Indication: "OL" is shown on the display.
- Sample Rate: Approx. 0.5 ~ 2.5 times per second
- Operating Temperature & Humidity: 0 ~ +40°C, relative humidity up to 85%
- Storage Temperature & Humidity: -20 ~ +60°C, relative humidity up to 75%
- Used location: altitude 2000m or less
- Insulation Resistance: More than 50M Ω at 1000V DC between electrical circuit and housing case
- Withstand Voltage: 3470V AC for five seconds between electrical circuit and housing case
- Overload Protection
Insulation resistance ranges:
 - 1000V Range 1200V (DC) for 10 seconds
 - 500V Range 600V (DC) for 10 seconds
 - 250V Range 300V (DC) for 10 seconds
 Continuity ranges:
 - 20/200/2000 Ω Range 440V (AC) for 1 minute
(Protection by fusing)
- Dimensions: 185(L) x 167(W) x 89(D) mm approx.
- Weight: 990g approx. (including batteries 3007A)
970g approx. (including batteries 3005A)
- Power Source: 8 x R6P, 1.5V AA or equivalent
- Auto-power-off Function: Automatically turns off approx. 10 minutes after the last switch operation.
Consumption current: approx. 75 μ A
- Accessories
 - Test Probe MODEL7122B x 1 set
 - Strap belt x 1
 - Test probe pouch x 1
 - Batteries (R6P) x 8
 - Instruction manual x 1
 - Spare fuse F600V/500mA x 1

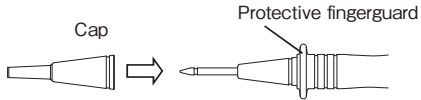
4. INSTRUMENT LAYOUT

4-1 INSTRUMENT LAYOUT



- ①... LCD DISPLAY
- ②... TRAC-LOK SWITCH (Model 3007A only)
- ③... RANGE SELECTOR SWITCH
- ④... TEST BUTTON
- ⑤... CONNECTOR
- ⑥... BACK LIGHT SWITCH (Model 3007A only)
- ⑦... FUNCTION SWITCH
- ⑧... TEST PROBE (RED)
- ⑨... TEST PROBE (BLACK)
- ⑩... ALLIGATOR CLIP (BLACK)
- ⑪... PROBE (BLACK & RED)
- ⑫... PROTECTIVE FINGERGUARD

Note: It is a part providing protection against electrical shock and ensuring the minimum required air and creepage distances.



Protective fingerguard :

It is a part providing protection against electrical shock and ensuring the minimum required air and creepage distances.

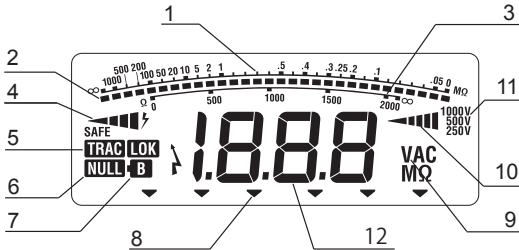
Cap :

Uncapped condition for CAT II environment

Capped condition for CAT III/ IV environments

The Cap should be firmly attached to the probes.

4-2 LCD DISPLAY







1... INSULATION RESISTANCE SCALE

2... BAR GRAPH

3... CONTINUITY SCALE

4... LIVE CIRCUIT WARNING

	AC LIVE CIRCUIT WARNING	DISCHARGE VOLTAGE
SAFE	0~2V	0~2V
	3~30V	3~60V
	31~60V	61~120V
	61~120V	121~240V
	120V over	240V over

5... TRACK/LOK MODE






6... AUTONULL OPERATION

7... BATTERY VOLTAGE WARNING

8... CONTINUITY/INSULATION RESISTANCE RANGE SETTING

9... UNIT

10...OUTPUT VOLTAGE GRAPH (INSULATION RESISTANCE)

	FUNCTION SETTING PER RATED OUTPUT VOLTAGE
	1~24%
	25~49%
	50~74%
	75~99%
	100% or over

11... OUTPUT VOLTAGE RANGE

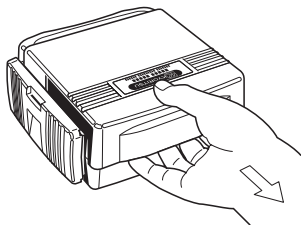
12... MEASUREMENT VALUES

5. PREPARATION FOR MEASUREMENT

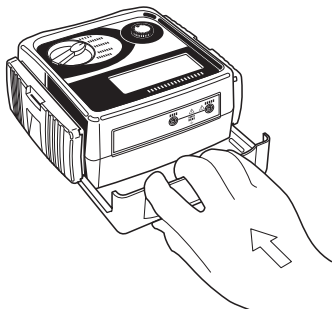
5-1 Removing the Cover

Model 3005A/3007A have a dedicated cover to protect against an impact from the outside and prevent the operation part, LCD, and connector socket from becoming dirty. The cover can be detached and put on the back side of the main body during measurement.

Method of removing the cover



Method of storing the cover



5-2 Battery Voltage Check

- ① Set the function switch to any position except “OFF”.
- ② When the battery voltage warning symbol (**B**) is lit, the batteries are exhausted. Replace all of them with new ones according to section 8 for battery & fuse replacement.

5-3 Test Probe Connection

Insert test probes fully into connector terminals of the instrument.
Connect test probe (black) to EARTH terminal and test probe (red) to LINE terminal of connector terminal.

6. OPERATION

6-1 Disconnection and check of power source of the circuit under test

⚠ DANGER

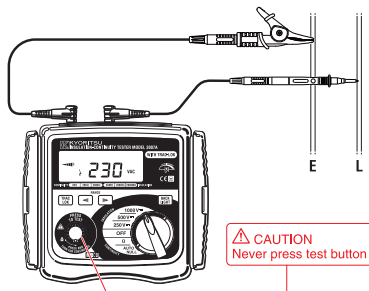
- To avoid possible electrical shock, do not perform measurements on energized (LIVE) circuits.
- Never open the battery compartment cover when making measurement.
- Verify proper operation on a known source before use or taking action as a result indication of the instrument.

⚠ CAUTION

- Never press the test button if the live circuit warning is indicated or the warning buzzer sounds. This may damage the circuit.
- When the instrument is left powered on, the auto-power-off function automatically shut the power off; The display blanks even if the Function Switch is set to a position other than the OFF position in this state. To return to the normal mode, turn the Function Switch off, then to the desired position. If the display still blanks, the batteries are exhausted. Replace the batteries.
- Keep your fingers and hands behind the protective fingerguard during measurement.

Voltage check can be made with the function switch at any position except "OFF". Be sure to turn off the breaker for the circuit under test.

- ① Connect the test probe (black) to the earth side and the test probe (red) to the line side of the circuit under test.
- ② Ensure that the live circuit warning is not lit and the audible warning is not present. When the live circuit warning is lit and the buzzer sounds, never press the test button. Voltage is generated in the circuit under test. Recheck that the breaker for the circuit under test is "OFF".



6-2 Insulation Resistance Measurement

DANGER

- Always test the circuit or equipment to ensure it is surely de-energized before measurement according to the instruction of 6-1.
- To avoid electrical shock, measurements must be performed on de-energized circuits only.
- When the test button is pressed with the function switch in the $M\Omega$ position, take care not to touch the tip of the test probe and the circuit under test where a high voltage is present in order to avoid possible shock hazard.
- Never open the battery compartment cover when making measurement.
- Verify proper operation on a known source before use or taking action as a result indication of the instrument.

CAUTION

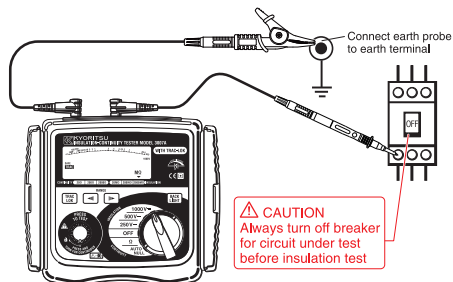
- Never press the test button if the live circuit warning is indicated or the warning buzzer sounds. This may damage the circuit.
- Conduct the voltage warning check before measurement to ensure that the circuit under test is de-energized.
- Keep your fingers and hands behind the protective fingerguard during measurement.

- ① Check the voltage which can be applied to the circuit under test and set the Function switch and the range selector switch to the desired range.
- ② Connect the test probe (black) to the earth terminal of the circuit under test.
- ③ Put the tip of the test probe (red) to the circuit under test and press the test button.

The buzzer sounds intermittently during measurement.

Current outputs from the earth terminal, and returns to the line terminal.

- ④ Read the resistance value from the LCD.



- ⑤ With the test probe still connected to the circuit under test, release the test button to discharge capacitance in the circuit after measurement.

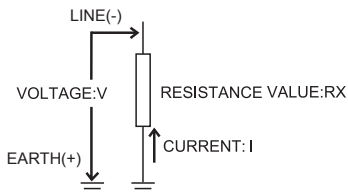
⚠ DANGER

Do not touch the circuit under test immediately after testing. Capacitance stored in the circuit may cause electric shock. Leave test probes connected to the circuit and never touch the circuit until the discharge is completed.

● Principle of Insulation Resistance Measurement

Resistance value can be obtained by applying a certain high voltage to the resistance (insulation resistance) and measuring the flowing current.

$$\text{Resistance Value} = \text{Voltage} / \text{Current}$$
$$R_X = V / I$$



● Terminal connection of insulation resistance test

In case of testing insulation of insulated wire and cable against the earth at direct current, connecting – pole of power to cable conductor, + to the earth obtains smaller measuring value, compared with connecting the other way round. This connecting method is generally acknowledged relevant to detect defective insulation.

6-3 Continuity Measurement (Resistance Tests)

 **DANGER**

- Always test the circuit or equipment to ensure it is surely de-energized before measurement according to the instruction of 6-1.
- To avoid electrical shock, measurements must be performed on de-energized circuits only.
- Never open the battery compartment cover when making measurement.
- Verify proper operation on a known source before use or taking action as a result indication of the instrument.

 **CAUTION**

- Never press the test button if the live circuit warning is indicated or the warning buzzer sounds. This may damage the circuit.
- When an additional circuit is connected in parallel with the circuit under test, inaccurate reading may be taken.
- Keep your fingers and hands behind the protective fingerguard during measurement.

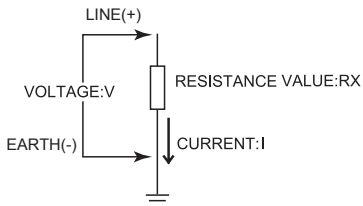
- ① Set the Function switch to the “AUTO NULL” position.
- ② Short the test probes (red) and (black) and press the test button. Then the resistance of the test probes is displayed and memorized with microprocessor.
- ③ Set the Function switch to “ Ω ” position.
- ④ Connect the test probes to the circuit under test and press the test button.
- ⑤ Read the resistance value from the LCD.

- NULL symbol (**NULL**) is displayed while AUTO NULL function is working.
- AUTO NULL will be cancelled when the instrument is powered off.

● Principle of Continuity Measurement (Resistance Test)

Resistance value can be obtained by applying a certain current to the resistance under test and measuring the voltage generated on the both sides of the resistor under test.

$$\begin{aligned} \text{Resistance value} &= \text{Voltage} / \text{Current} \\ R_X &= V / I \end{aligned}$$



6-4 Continuous Measurement

A lock down feature is incorporated on the test button. Pressing and turning it clockwise, lock the test button in the continuous operating position. To release the lock, turn the test button counterclockwise.

Note:

Model 3007A has TRAC/LOK function. When “LOK” mode is selected, sampling is conducted only once, even though the test button is locked down for continuous measurement.

To make continuous measurement, select “TRAC” mode.

⚠ DANGER

Be extremely careful not to get electric shock during insulation resistance measurement as high voltage is present on the tip of test probes continuously.

7. FUNCTIONS

7-1 TRAC-LOK MODE (Model 3007A)

TRAC mode : Measurement can be conducted while the test button is being pressed.

When making continuous measurement, select this mode.

LOK mode : When the test button is pressed, measurement can be conducted only once, and output is stopped, then automatically discharged.

This allows to economize on the battery life.

7-2 AUTO NULL

When conducting continuity tests, the contact resistance of test probes etc. is automatically subtracted before the real resistance is displayed to obtain more accurate reading.

This function is invalid when the contact resistance, etc. is 10Ω or more.

- NULL symbol (**NULL**) is displayed while AUTO NULL function is working.
- AUTO NULL will be cancelled when the instrument is powered off.

7-3 BACK LIGHT (Model 3007A)

Use BACK LIGHT to facilitate working at night or dimly lit situations.

When the back light switch is pressed with the function switch in any position except "OFF", the back light continues illuminating for approx. 40 seconds and then turns off automatically.

When the back light switch is pressed again, the BACK LIGHT will turn off even within the lighting time.

Press the back light switch while it is on, the light gets brighter. Press it again to turn it OFF.

7-4 AUTO-POWER-OFF

The instrument automatically turns off approx. 10 minutes after the last switch operation. To return to the normal mode, turn the function switch off, then to the desired position.

CAUTION

Slight current is still consumed even after the instrument was powered off by auto-power-off function. Turn the function switch to the "OFF" position when not using the instrument.

8. BATTERY & FUSE REPLACEMENT

DANGER

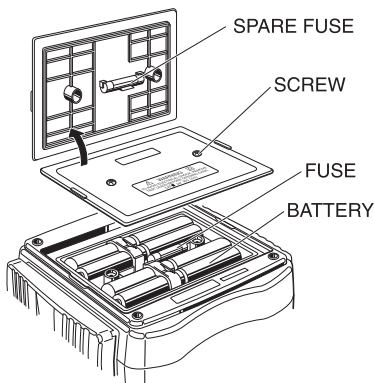
- Never open the battery compartment cover when making measurement. Ensure that the Test Lead is disconnected from the object under test, and that the instrument is powered off when opening the battery compartment cover for battery or fuse replacement.
- Replacement fuse must have the following rating.
Fast acting type, F 500mA/600V, ϕ 6.35×32mm

8-1 Battery Replacement

- ① Disconnect test probes from the instrument.
- ② Open the battery compartment cover by unscrewing the metal captive screw to reveal battery compartment. Always replace all eight batteries with new ones at the same time.
Battery type: 8 x R6P, 1.5V AA or equivalent

8-2 Fuse Replacement

- ① Disconnect the test probe from the instrument.
- ② Open the battery compartment cover by unscrewing the metal captive screw to reveal battery compartment and replace the fuse.
Fuse type: 600V/500mA (F) quick acting ceramic fuse 6.35 x 32mm

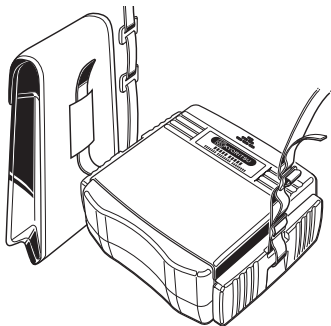


CAUTION

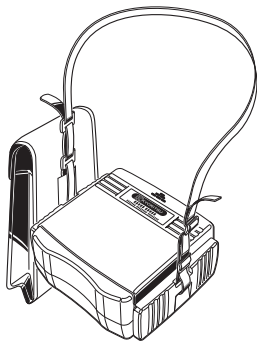
Install batteries in correct polarity as marked inside the case.

9. CASE AND STRAP BELT ASSEMBLY

By hanging the instrument around the neck, both hands can be used freely for easy and safety working.



Pass the strap belt down through the side panel of the main body from the top, and up through the slots of the probe case from the bottom.



Pass the strap through the buckle, adjust the strap for length and secure.

10. CLEANING OF THE INSTRUMENT

- When cleaning the instrument, wipe it with a silicon cloth or soft cloth to remove dust or dirt.
- When it is hard to remove the dirt, wipe it with a cloth wet with water and dry the instrument completely after cleaning.

 **CAUTION**

Use a damp cloth and detergent for cleaning the instrument. Do not use abrasives or solvents.

11. SERVICING

If this tester should fail to operate correctly, return it to your nearest distributors stating the exact nature of the fault.

Before returning the instrument, make sure that:

- a) Operating instructions have been followed.
- b) Leads have been inspected.
- c) Fuse has been checked.
- d) Battery has been checked.
- e) The unit is returned with all accessory leads.

Remember, the more information written about the fault, the quicker it will be serviced.

DISTRIBUTOR

Kyoritsu reserves the rights to change specifications or designs described in this manual without notice and without obligations.



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