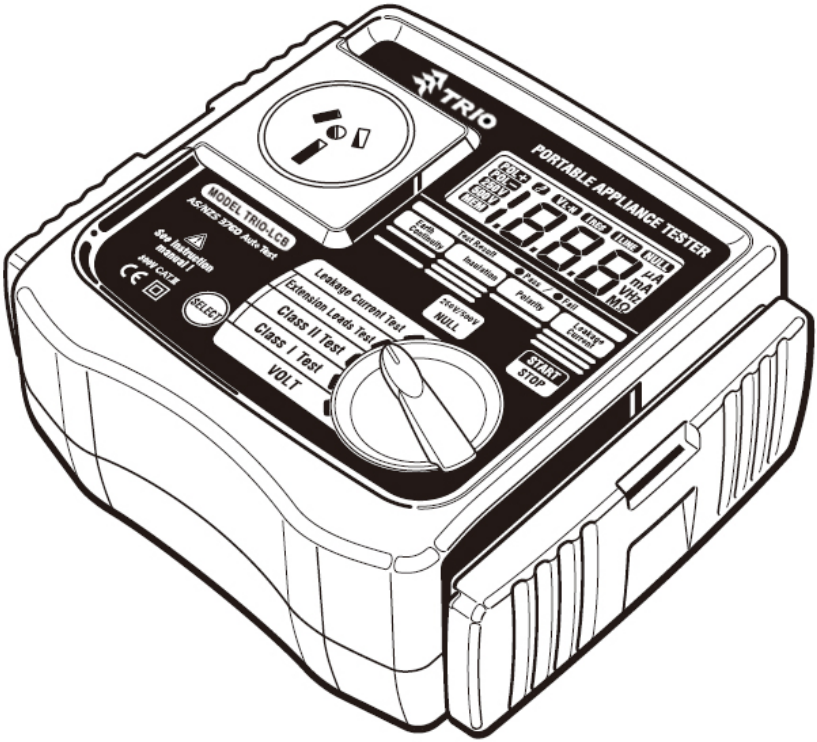
Instruction Manual

TRIO-LCB PORTABLE APPLIANCE TESTER



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1. Safe testing

Always treat electricity with the greatest respect and care. If you are not sure how to proceed, stop and take advice from a qualified person.
This instruction manual contains warning and safety rules which must be observed by the user to ensure safe operation of the TRIO-LCB. Please read these operating instructions before using the TRIO-LCB.

IMPORTANT:

The TRIO-LCB must be used only by a competent and trained person and operated in strict accordance with the instructions. TRIO Test & Measurement Solutions will not accept liability for any damage or injury caused by misuse or non-compliance with the instructions or with the safety procedures. It is essential to read and to understand the safety rules contained in the instructions. The symbol ⚠ indicated on the instrument means that the user must refer to the related sections in the manual for safe operation . Be sure to carefully read instructions following each symbol in this 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 minor injury or instrument damage.

⚠ DANGER

- ⚠ This instrument can be connected only to the commercial power of 240V+10%-10%, 50/60Hz.
- ⚠ For safety reasons, only use the Test Leads designed to be used with this instrument and recommended by TRIO Test & Measurement Solutions.
- ⚠ Use only grounded mains outlets to supply the instrument.
- ⚠ Do not touch the device under test while testing is in progress.
- ⚠ When testing, always be sure to keep your fingers behind the safety barriers on the test leads.
- ⚠ Disconnect the instrument from the power supply when measurement is finished.
- ⚠ Do not leave the instrument with connected to the power supply.

⚠ WARNING

- ⚠ Never open the instrument case – because dangerous voltages are present. Only fully trained and competent technicians should open the case.
- ⚠ If abnormal conditions of any sort are noted (such as a faulty display, unexpected readings, broken case, cracked test leads, etc) do not use the instrument and return it to your distributor for inspection and repair.
- ⚠ Never attempt to use the instrument if the instrument or your hand is wet.

⚠ CAUTION

- ⚠ When using Test Leads with alligator clip, be sure to check the alligator clip is firmly connected to the metal part of the device under test. Otherwise, inaccurate measurement or arc at the contacts may occur.
- ⚠ The rated measuring voltage for insulation test is 500V.DC.
- ⚠ When testing faulty device, it may trip the circuit breaker of main power supply during test and may cause interruption of service. Be careful when the same main power supply is used for PCs.
- ⚠ We are not liable for loss of data on PC during testing with this instrument. The device under test is powered on during most tests, but please turn it to the OFF position after use.
- ⚠ Use a cloth dipped in water or neutral detergent for cleaning the instrument. Do not use abrasives or solvents.

2. Procedure of removing cover

The TRIO-LCB has a dedicated cover to protect against an impact from the outside and prevent the operation part, the LCD, and the connector socket from becoming dirty. The cover can be detached and put on the back side of the main body during measurement.

2.1 Method of removing the cover

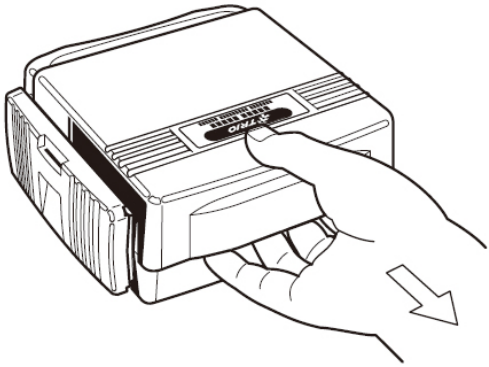


Fig 1

2.2 Method of storing the cover

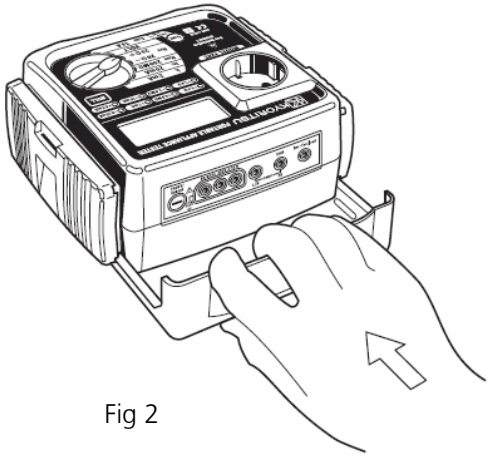


Fig 2

3. Product summary and explanation

3.1 Product summary

The TRIO-LCB is a hand-held portable appliance tester, performing four functions to ensure the Safety of Class I and Class II appliances. And also can measure the mains voltage. Readings are displayed on a large liquid crystal display (LCD) below which are three LEDs, which light up in either red or green unambiguously displaying a pass or fail indication.
This instrument is suitable for performing tests as required by the following standards.
AS/NZS 3760: 2003 In-service safety inspection and testing of electrical equipment.
This instrument is designed to check the electrical safety of appliances of Class I and Class II categories.
As a guide IEC standard define these two categories as follows:

Class I: Appliances which have a functional insulation throughout and an earth connected case. These are often described as earthed appliances.
Class II: Appliances which have both functional and additional insulation where any metal parts cannot become "Live" under fault conditions.

3.2 Test Function

The TRIO-LCB has following features.

Function	Tests of contents
Class I Test	• Protective conductor resistance • Insulation (250V or 500V)
SELECT Switch + Class I Test	• Protective conductor resistance • Leakage Current test
Class Test	• Insulation (250V or 500V)
SELECT Switch + Class II Test	• Leakage Current test
Extension Leads test	• Protective conductor resistance • Insulation P-N and P/N-PE • Polarity

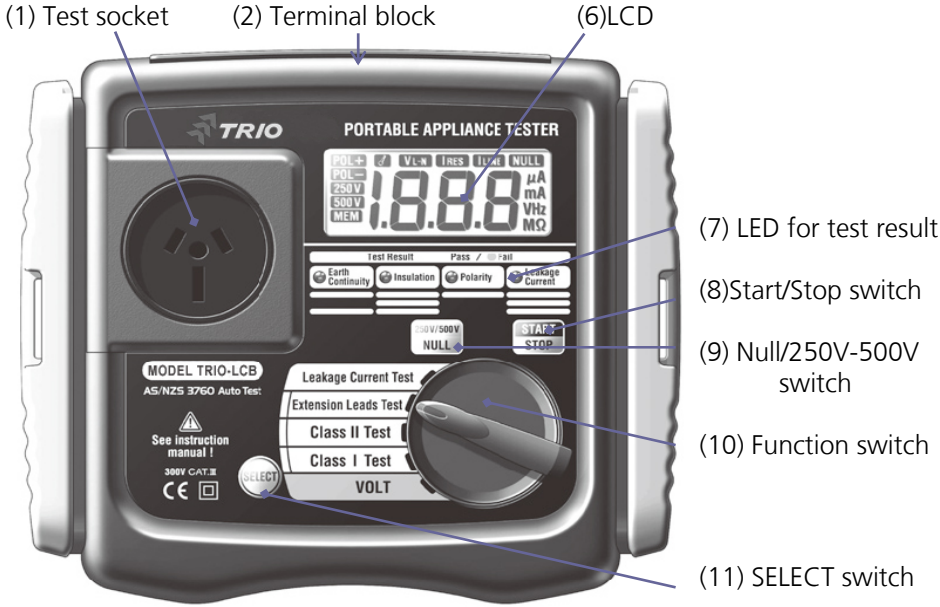
SELECT Switch + Extension Leads test	• Protective conductor resistance • Polarity • Leakage Current test
Leakage Current Test	• Leakage current measurement

3.3 Features

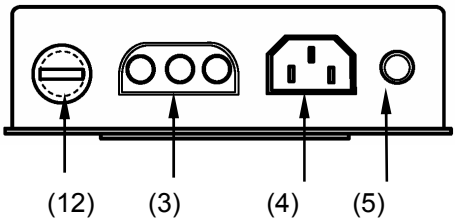
- Warning for the appliance to be ON.
- Selection for 250V or 500V on the insulation resistance test.
- Null function for the protective conductor resistance test.
- Warning for the over range value in the LCD.
- Capable of judging pass/fail of tests by LED on the panel and by buzzer.

3.4 INSTRUMENTS LAYOUT

Fig 3



Terminal Block



(1) Test socket
Insert the mains plug of DUT to this socket for the polarity test of protective conductor resistance, insulation resistance and Extension leads.

(2) Terminal block
Connect the attached mains cord and Test Leads to this terminal block.

(3) Terminal for mains cord
This terminal is connected to a mains supply via M7123.

(4) Terminal for Extension leads adaptor
It corresponds to L, N, E of test socket, and the extension leads adaptor (M-7140) connected with the cord reel to be plugged to it.

(5) PE-probe terminal
Connect the Test Lead with alligator clip (M7129)(13) to this terminal for the measurement of protective conductor resistance, and clip the metal parts of DUT with the alligator clip.

(6) LCD
Measured value is displayed

(7) LED for test result
When the value of protective conductor resistance and insulation resistance exceeds the limit dictated by applicable standards, LED lights up in red. When it is within the limit, LED lights up in green.

(8) Start/Stop switch
A measurement starts by pressing this switch.
Pressing the Start/Stop Switch again during Leakage Current Test stops measurements.

(9) Null/250V-500V switch
- Class I test measurement

It is used in order to push the Null button before protection earth resistance measurement and to cancel the resistance of a test leads.

- Class II test measurement

The test voltage of insulation resistance is changed to 500V and 250V.

(10) Function switch
Select a function with this switch.

(11) SELECT switch
When the function is set under SELECT switch is pressed, the appliance will be actually operated to measure a leakage current instead of measuring insulation.

(12) Fuse
Protected by a fuse of 600V/10A ceramic fuse (F type Φ6.3x32mm).
User can replace this fuse.

(13) Mains cord (AU) M-7123
This mains cord can be connected to the mains supply so that the instrument can derive power from it. To measure contact current, the socket of the main power supply is to be equipped with an earth terminal.

Fig 4

(14) Test Lead with safety alligator clip(M-7129) and Probe with Blade type Prod(M-7101).The adapter of a tip part is exchangeable for an alligator clip and a test stick type.

Please use it according to a measurement use.

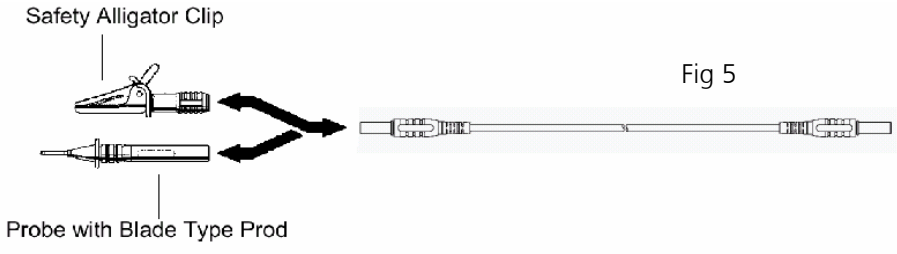


Fig 5

(15) Extension leads adaptor(M-7140)
This is for connecting the instrument and a cord reel.

Fig 6

3.5 Explanation for indications LCD Display

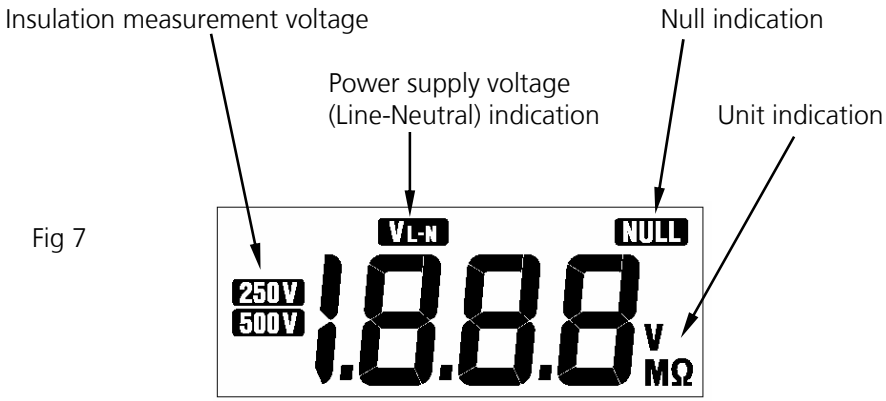


Fig 7

Note) Over range display: "OL" is displayed on the LCD.

Display symbols

OFF	DUT is OFF.	LnE	Represents LN-E.
StP	When leakage current test is interrupted.	LEA	Represents leakage current.
Con	Represents Protective conductor resistance		During the DUT is operated at the leakage current test.
no	Represents the test is fail.	S- on	Display prompt the user to set the DUT switch on.

3.6 Applicable standards

Instrument operation
AS/NZS 3760: 2003 In-service safety inspection and testing of electrical equipment.

Safety: IEC/EN61010-1 CAT.III 300V-instrument
IEC/EN61010-031 CAT.III 300V(600V)-test lead

4. Specification

4.1 General specification, measuring range and accuracy

Voltage(VOLT) measurement of main power supply

Measuring range	207 ~ 264V AC
Resolution	1V
Accuracy	± (2%rdg+3dgt)

Measurement of Protective conductor resistance(RPE)

Measuring range	0 ~ 19.99Ω
Resolution	10mΩ
Open-circuit voltage	<AC12V
Measuring current	10A AC nominal value
Accuracy	± (3%rdg+5dgt)

Measurement of Insulation resistance (RINS)

Rating	250V/20MΩ and 500V / 20MΩ
Measuring range	0~19.99MΩ
Resolution	10kΩ
Rated voltage	250V/500V DC(+20%/-10%) @1MΩ
Short-circuit current	2.5mA DC or less
Accuracy	± (2% rdg+3dgt)

Leakage current test

Measuring range	AC0.1~ 19.99mArms
Resolution	0.01mA
Accuracy	±(3%rdg ± 5dgt)
Examination time	Max 15 seconds

Note: For MOV appliances use Leakage Current test.

4.2 Threshold and display

Equipment	Protective conductor resistance	Insulation resistance	Leakage current
Class I	RPE ≦ 1Ω	RINS > 1MΩ	IEL≦5mA
Class II		RINS > 1MΩ	IEL≦1mA
Extension Leads	RPE ≦ 1Ω	RINS > 1MΩ	IEL≦1mA

4.3 Reference test condition

Unless otherwise specified, this specification is dependent on following condition.

(1) Ambient temperature: 23±5˚C
(2) Relative humidity: 45 ~ 75%
(3) Attitude: Horizontal
(4) AC power supply: 240V, 50Hz
(5) Altitude: 2000m or less

Operating temperature and humidity range
0°C ~ +40°C Relative humidity: 85% or less (no condensation)

Storage temperature and humidity range
-20°C ~ +60°C Relative humidity: 85% or less (no condensation)

Rate voltage and frequency
Rated voltage: 240V ±10%
Rated frequency: 50 Hz ±1%

Maximum rated power
Approx. 9VA

Outer dimension and weight
Outer dimension: 185(L) × 167(W) × 89(D)mm
Weight: Approx. 1.2kg (only the instrument body)

Symbols used on the instrument:

⧈ Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION
⚠ Caution (Refer to the accompanying instruction manual)

5. Preparation before a measurement

5.1 Visual inspection

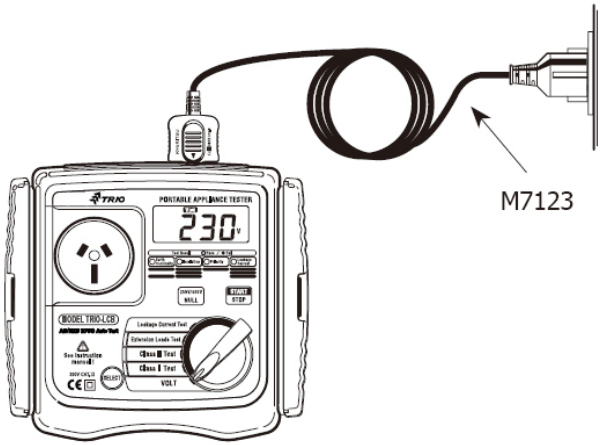
Before starting a measurement, user should undertake visual checks on the mains cord, case and that the correct type and rated fuse is fitted to the DUT. And also there should be no evidence of damage of a nature that may impair the electrical safety of the item.

5.2 Connection to main power supply

5.2.1 Connection of mains cord

Set the Function switch to VOLT Function, and connect the mains supply and the instrument with M7123 mains cord.

Fig.8



⚠ CAUTION

⚠ Always be sure to check there is no abnormal conditions or damage on the instrument and cords.
If any evidence of abnormality is found, measurement shall be stopped immediately.

⚠ The outlet of main power supply must have earth terminal.

⚠ This instrument can be only connected to the commercial power of 240V+10%-10%, 50Hz.

5.2.2 Check the power supply voltage

There is no power switch and the instrument is immediately ready for use. Power supply voltage is displayed on the LCD. Please check the value, and when it is from 216V to 264V, the instrument can perform correct measurements. If the displayed value is out of above range, do not make a measurement.

> ⚠ WARNING
> ⚠ When the voltage of main power supply is 265V or more, "HI-V" is displayed on the LCD and buzzer sounds (discontinuous sounds).
> ⚠ In that case, disconnect the mains cord of the instrument from main power supply.

5.2.3 Null setting

A criteria of judgment for Earth Continuity is 1Ω, and it is low value.
So even the resistance of Test Leads will affect the measurement result.
The TRIO-LCB can cancel the resistance of Test lead by pressing Null|250V/500V switch. The procedure of Null setting is shown below.
The Null function is not released even if power off the instrument, therefore, there's no need to do Null setting at every measurement.
However, when replacing fuses or test leads, it is recommended to do Null setting again.

Procedure:

(1) Set the function switch to Class I Test function.
(2) Connect the mains supply and the instrument with M7123 mains cord.

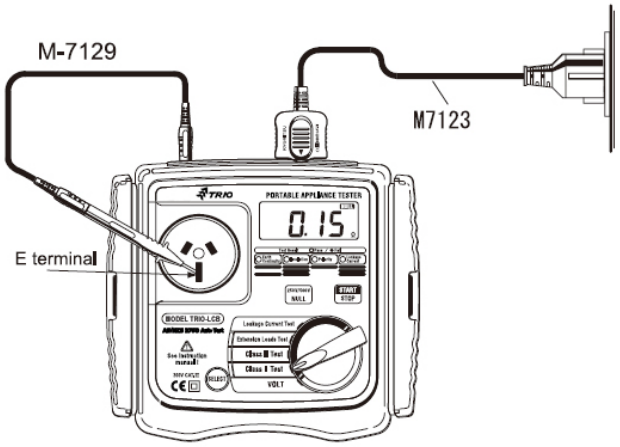


Fig.9

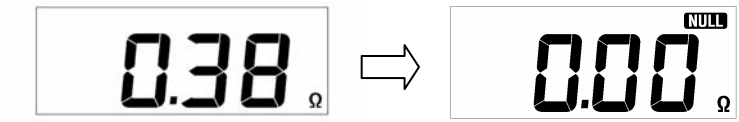
(3) Insert Test Lead with safety alligator clip (M-7129) in to the E terminal of the instrument, and contact the tip of the Test Lead with the metal parts of the socket on the instrument.

Press Null|250V/500V switch with contacting the Test Lead and the metal parts, the resistance of Test Lead will be displayed on the LCD as shown above fig.10 for 2sec.

Then, the instrument cancels the resistance value of Test Lead and adjusts the displayed value to "0.00" as shown below fig.10.
At this point, the NULL mark is displayed in the LCD.
The Null setting cannot be done when a resistance is 3Ω or more.
A message "no" appears to indicate a resistance is exceeding the Null setting range.

Display at Null setting

Fig.10

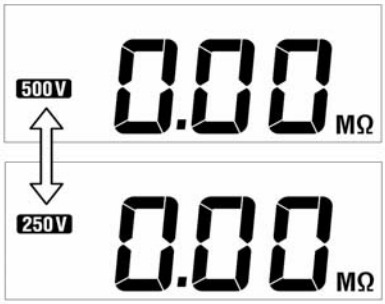


(4) Null setting can be released by pressing Null|250V/500V switch for 2sec. The NULL mark on the LCD will disappear when Null setting is released. Null setting and release can be done on Class I Test function only.

5.2-4 Voltage setting for insulation resistance measurement (How to change 250V and 500V)

(1) Set the function switch to Class II Test function, and press the Null|250V/500V switch. Then the mark to indicate the selected voltage is shown on the LCD. By pressing Null|250V/500V switch, 250V and 500V can be changed over.

Fig.11



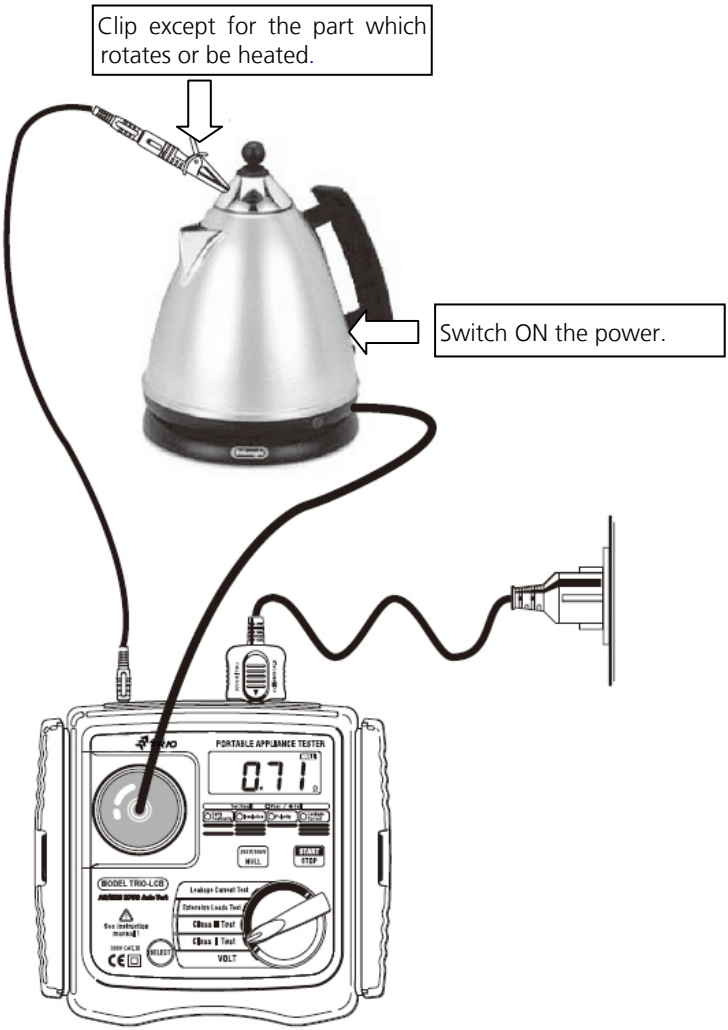
6. Measuring method

6.1 Class I Test

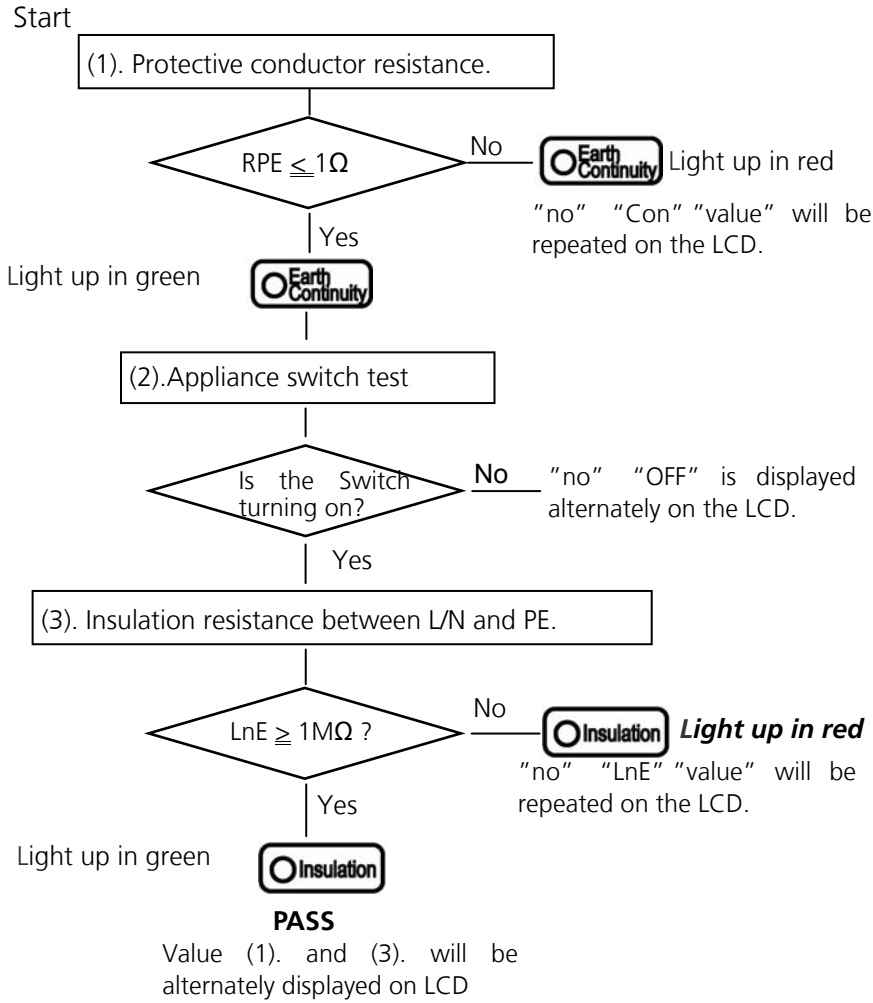
The purpose of the test carried out for Class I appliances is to check the insulation resistance between accessible conductive parts and connection of protective earth and between live wire parts and accessible conductive parts is within the range defined in the standards. To conduct the tests of protective conductor resistance and insulation resistance for DUT, connect the mains plug of DUT to the test socket (1) described in clause 3.4. INSTRUMENTS LAYOUT and PE probe terminal (5).

Use the following setups, depending upon the type of DUT.

Fig.12



Class I Test Flowchart



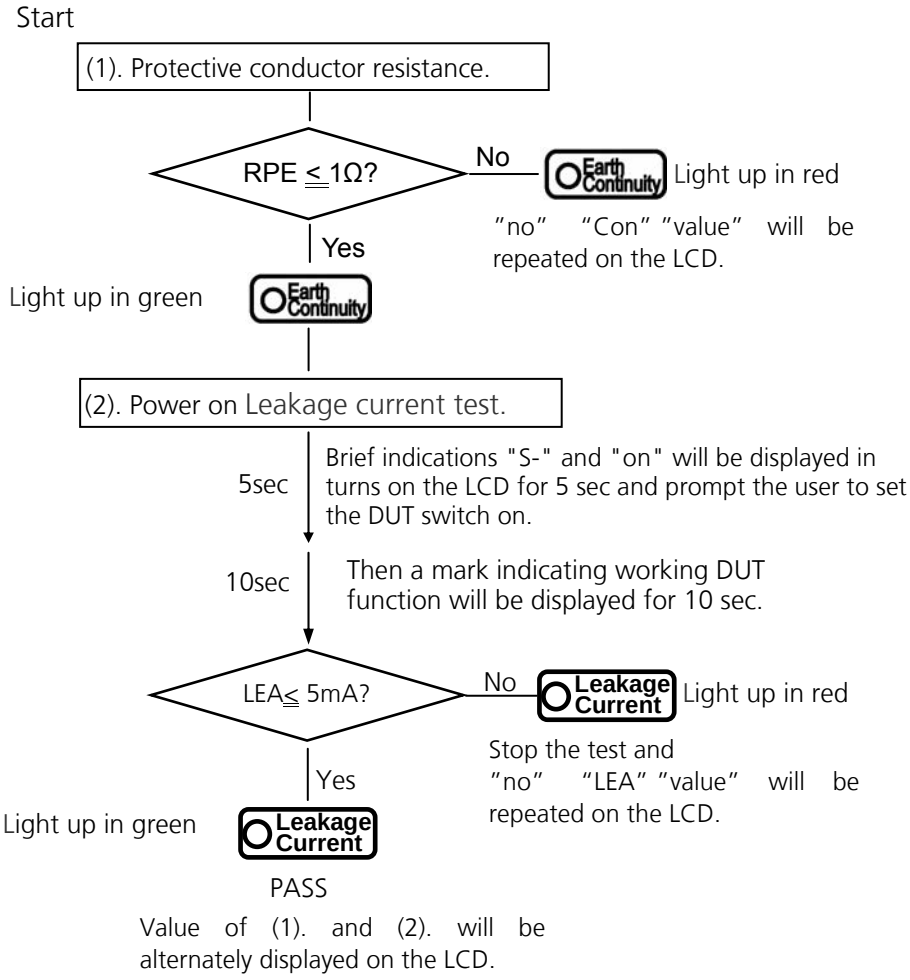
⚠ CAUTION

⚠ Follow the procedure described in 5.2-3 and do NULL setting before a measurement.
⚠ Alligator clip must make good contact with the enclosure of the DUT.
⚠ When the terminal is open or the resistance value exceeds measuring range, "OL" mark (over range display) appears on the LCD.
⚠ Do not touch the device under test while testing is in progress.

6.2 Class I Test (Select the Leakage current test)

Selecting "Class I test" while Select Switch is being pressed down initiates Leakage current test instead of Insulation resistance test.
In case of selecting Leakage current test, metal parts other than the heating or movable parts must be clipped with Test Lead M-7129 since the DUT activates. Pressing the START/STOP switch during Leakage current test stops the test immediately. To restart the test, press the START/STOP again after about 2 seconds or more from the stop. Then (1) Protective conductor resistance will be restarted.
Fig 12 indicates how to connect the devices.

Class I Test (Select the Leakage current test) Flowchart



⚠ CAUTION

⚠ When the terminal is open or the resistance value exceeds measuring range, “OL” mark (over range display) appears on the LCD.

⚠ The test will stop. A message “Stp” appears on the LCD but values of Leakage current aren’t displayed.

⚠ WARNING

⚠ Operate a device and measure the leakage current flowing on it at Leakage current test function. Care should be taken not to touch with the heating or movable parts during tests. Extra care should also be taken to light and heat generated by the device.

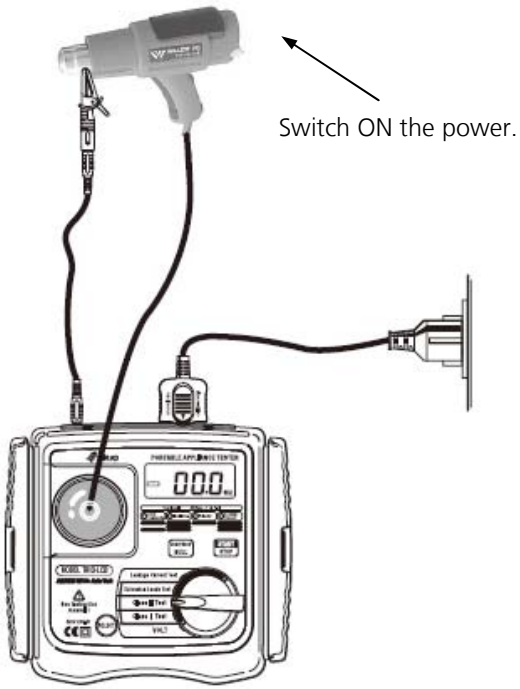
⚠ Firmly insert the plugs of DUT to the AU socket of this instrument. Plugs may be heated if Leakage current test is performed with improper connection.

⚠ Do not connect/remove the plugs during Leakage current test. It may cause reading error. Do not use the instrument on the device which has a power of 2kVA or more.

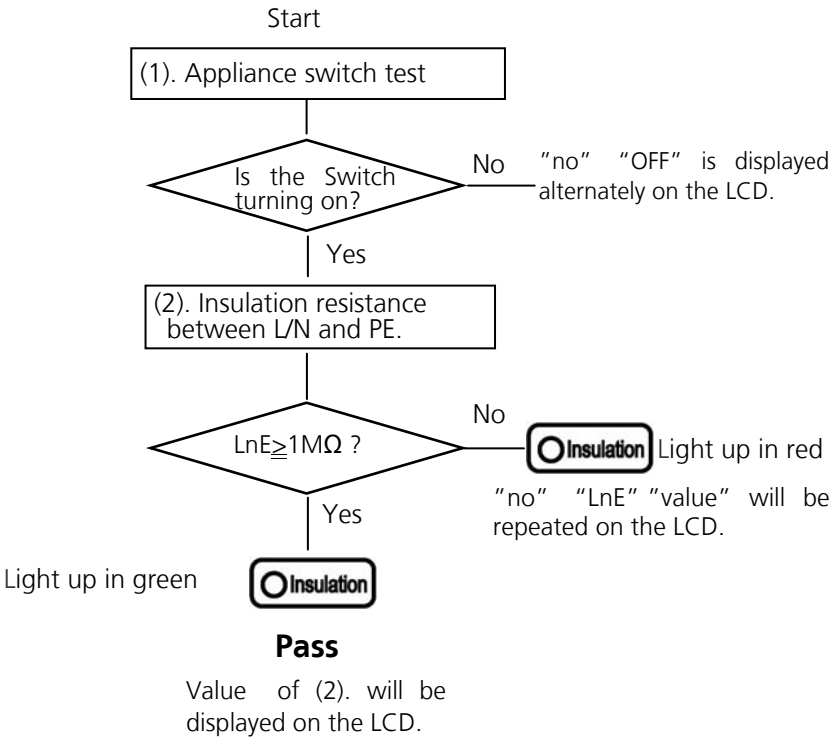
6.3 Class II Test

The Class II appliances have the indication of "DOUBLE INSULATION" or the symbol of ⧈ Double insulation test is to check the insulation resistance of the appliances is within the range defined in the standards.

Fig.13



Class II Test Flowchart



⚠ CAUTION

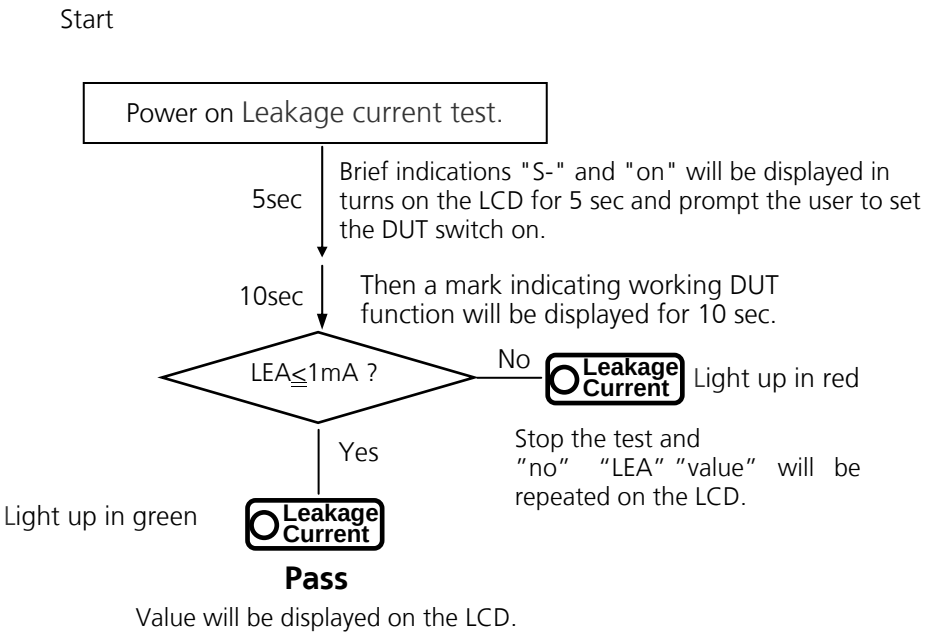
⚠ When the terminal is open or the resistance value exceeds measuring range, "OL" mark (over range display) appears on the LCD.

⚠ Do not touch the device under test while testing is in progress. Since a high voltage of 500V, user may get electrical shock.

6.4 Class II Test (Select the Leakage current test)

When the function is set to Class II test while pressing Select switch, Power on leakage current test will be carried out instead of Insulation resistance test. When Leakage current test is chosen, DUT will turn on. Clip a metal part of the machine tool except for the rotating part with Test Lead M-7129. In order to stop testing the leakage current while measuring, press START/STOP . To start a test again, press START/STOP again after about 2 seconds or more from the stop. The test will be restarted.

Class II Test (Select the Leakage current test) Flowchart



⚠ CAUTION

⚠ When the terminal is open or the resistance value exceeds measuring range, “OL” mark (over range display) appears on the LCD.

⚠ The test will stop. A message “Stp” appears on the LCD but values of Leakage current aren’t displayed.

⚠ WARNING

⚠ Operate a device and measure the leakage current flowing on it at Leakage current test function. Care should be taken not to touch with the heating or movable parts during tests. Extra care should also be taken to light and heat generated by the device.

⚠ Firmly insert the plugs of DUT to the AU socket of this instrument. Plugs may be heated if Leakage current test is performed with improper connection.

⚠ Do not connect/remove the plugs during Leakage current test. It may cause reading error. Do not use the instrument on the device which has a power of 2kVA or more.

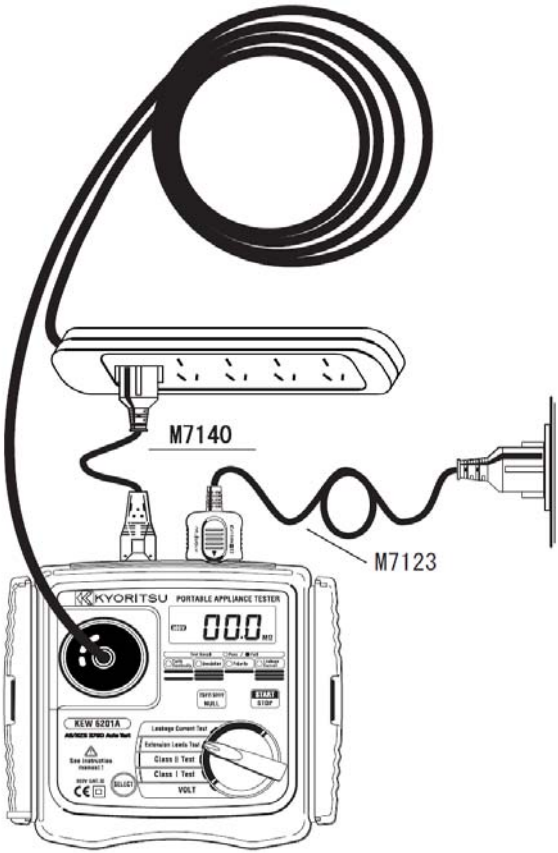
6.5 Extension Leads Test

This test is for extension leads, and check:

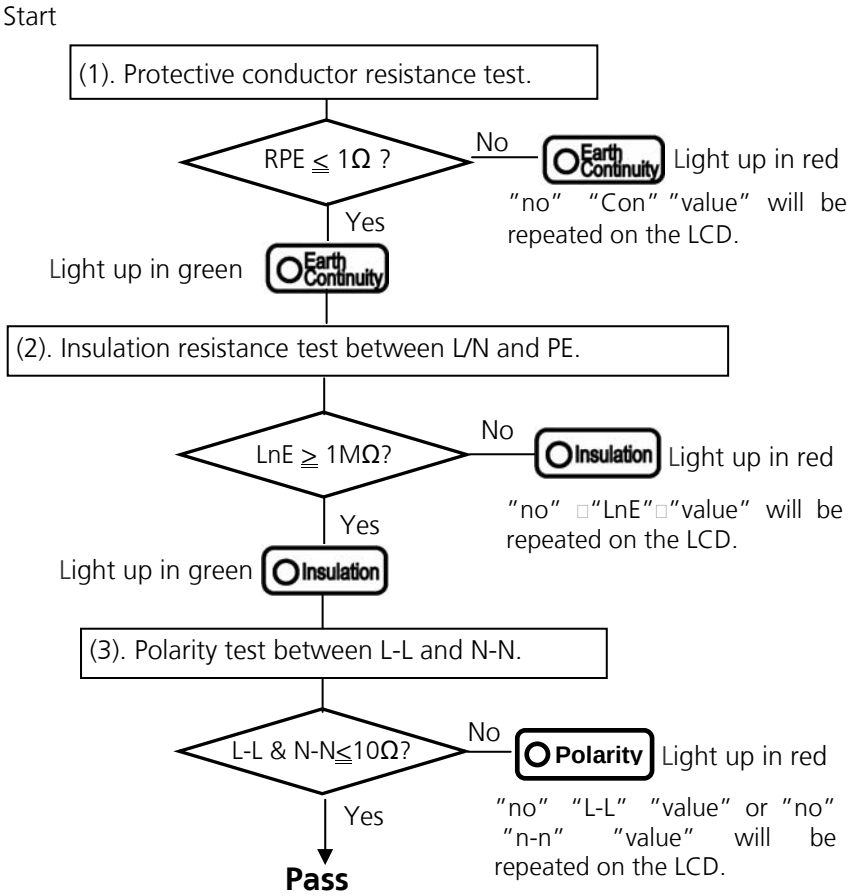
- Protective conductor resistance between accessible conductive parts and connection of protective earth.
- Insulation resistance between L/N and PE.
- Polarity check of the Line and Neutral terminal of plug and socket.

Test procedure and the connection are as follows.

Fig.14



Extension Leads Test Flowchart



⚠ CAUTION

⚠ Follow the procedure described in 5.2-3 and do Null setting before a measurement.

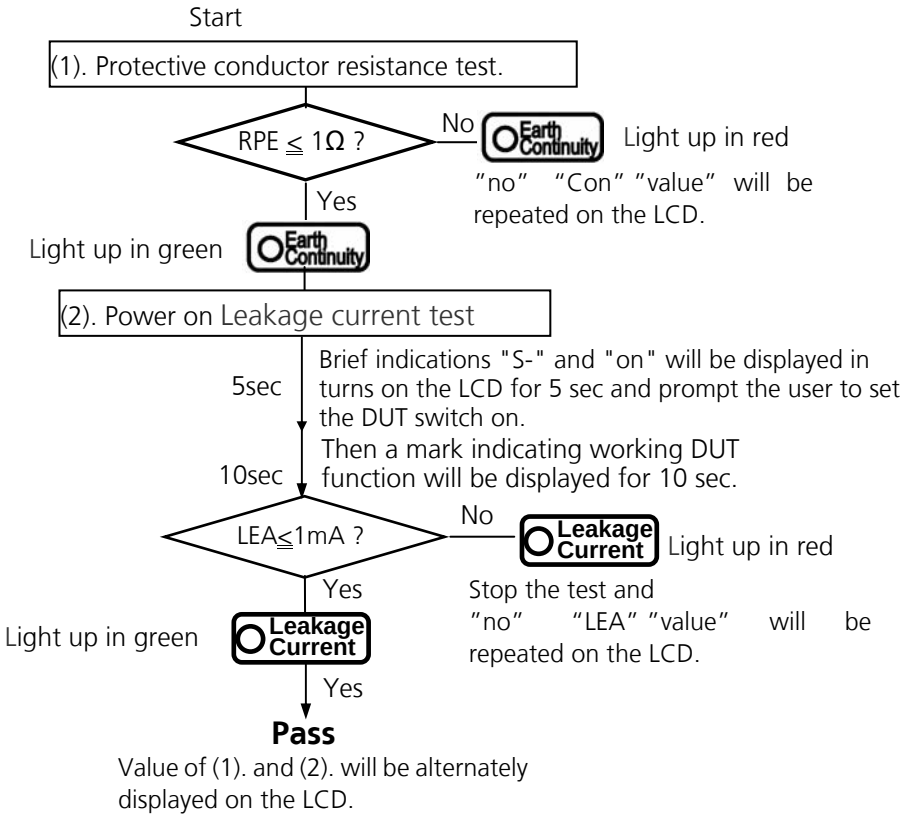
⚠ When the terminal is open or the resistance value exceeds measuring range, “OL” mark (over range display) appears on the LCD.

⚠ Do not touch the device under test while testing is in progress. Since a high voltage of 500V, user may get electrical shock.

When the function is set to extension leads test while pressing Select switch, Power on leakage current test will be carried out instead of Insulation resistance test.

- Protective conductor resistance between accessible conductive parts and connection of protective earth.
- Leakage Current test: Measure a leakage current by actually operating the appliance.

Extension Leads Test (Select the Leakage current test) **Flowchart**



⚠ CAUTION

⚠ When the terminal is open or the resistance value exceeds measuring range, "OL" mark (over range display) appears on the LCD.

⚠ The test will stop. A message "Stp" appears on the LCD but values of Leakage current aren't displayed.

⚠ WARNING

⚠ Operate a device and measure the leakage current flowing on it at Leakage current test function. Care should be taken not to touch with the heating or movable parts during tests. Extra care should also be taken to light and heat generated by the device.

⚠ Firmly insert the plugs of DUT to the AU socket of this instrument. Plugs may be heated if Leakage current test is performed with improper connection.

⚠ Do not connect/remove the plugs during Leakage current test. It may cause reading error. Do not use the instrument on the device which has a power of 2kVA or more.

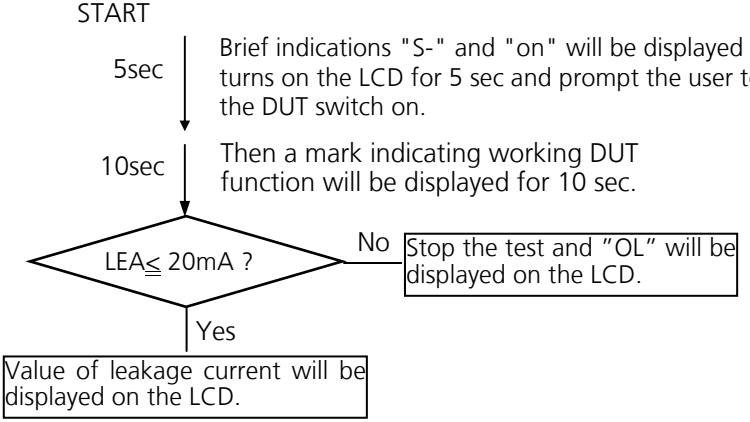
6.6 Leakage Current Test

This function is to conduct the leakage current test separately with DUT turned on. A leakage current only will be displayed on the LCD after DUT is electrified for 15 seconds.

LED will not light if either the Class I, Class II thresholds are exceeded.

- Set the function switch to Leakage Current Test position.
- Refer to the Fig12 or Fig13 for connection of an appliance.
- After set up is done, press START/STOP switch.
- Check the switch of DUT is ON.
- DUT will operate for 15 seconds, and the maximum value of the leakage current will be displayed on the LCD. If the leakage from the DUT is greater than 20mA then the TRIO-LCB should immediately stop the test.
- In order to stop the Leakage Current Test, press START/STOP switch again. The test will stop. A message "Stp" appears on the LCD but values of Leakage current aren't displayed.

Leakage Current Measurement Flowchart



⚠ WARNING

⚠ Operate a device and measure the leakage current flowing on it at Leakage current test function. Care should be taken not to touch with the heating or movable parts during tests. Extra care should also be taken to light and heat generated by the device.

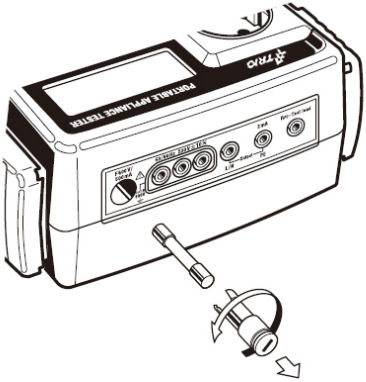
⚠ Firmly insert the plugs of DUT to the AU socket of this instrument. Plugs may be heated if Leakage current test is performed with improper connection.

⚠ Do not connect/remove the plugs during Leakage current test. It may cause reading error. Do not use the instrument on the device which has a power of 2kVA or more.

7. Fuse replacement

When the fuse blows during use, please replace with new one according to below procedure.

Fig.15



(1) Use a flat head screwdriver and turn it about 45° to left and remove the fuse cap and fuse.

(2) Remove the fuse from the fuse cap and replace it with new one.

(3) Install the fuse cap and fuse again. At that point, the screwdriver groove shall be at about 45° turned to left from the initial position. Use the flat head screwdriver and turn it to right.

(The screwdriver groove will stop at the horizontal position.)

⚠ WARNING

⚠ Be sure to remove mains cord from the instrument before replacing fuse.

⚠ The fuse that user can replace is this fuse only. Never attempt to perform the other repairing.

⚠CAUTION

⚠ Please use the specified fuse (Fast acting type ceramic fuse: 600V/10A - Φ6.3x32mm).

⚠ For the specified fuse, purchase it by yourself or order it from our agency.

8. Services

If this instrument should fail to operate correctly, return it to your distributor. Please remember to give all the information possible concerning the nature of the fault, as this will mean that the instrument will be serviced and returned to you more quickly.

9. Case and strap assembly

Strap belt and probe case can be attached to the instrument as below.
Pass the strap belt down through the side panel of the main body from the top, and up through the slots of the probe form the bottom. (Fig. 16).

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

Fig.16