IR750
INSULATION AND CONTINUITY TESTER OPERATING INSTRUCTIONS

182A910
(IR750A 182A911)
(IR750B 182A912)

CONTENTS

SEAWARD ELECTRONIC LTD.
Bracken Hill, South West Industrial Estate,
Peterlee, Co. Durham SR8 2SW. England.
Tel: 0191-586 3511 Fax: 0191-586 0227
www.seaward.co.uk
sales@seaward.co.uk
calibration@seaward.co.uk

READ INSTRUCTIONS BEFORE USE
Due to the potential hazards associated with any electrical circuit it is important that a user is fully familiar with instructions covering the capabilities, applications and operations of the instrument.

The user should ensure that all reasonable safety procedures are followed and if any doubt exists should seek advice before proceeding.
Symbols used on this equipment:

 -Equipment protected throughout by double or reinforced insulation.

 -Caution - Risk of electric shock.

 -Caution (refer to accompanying documents).

IR750 Insulation/Continuity Tester
Introduction
The IR750 is a compact, hand held digital insulation/continuity tester with a 3½ digit liquid crystal display.
The unit is contained in a rugged enclosure with test lead terminals at the upper end of the instrument and a battery compartment at the rear.
The controls consist of a six position rotary switch to select the test function, and a test switch.
When the test function is selected the test switch may be pressed for testing on any function.

The IR750B is the same as the IR750 in all respects with the exception of the 250V and 1KV range and the lead adjust facility.

The IR750A is the same as the IR750 in all respects with the exception of the 250V and 1KV ranges.

Essential Operating Procedure with the IR750
1. Before testing, always check the test leads by the procedures detailed under **Test Leads.**
2. Always ensure that the leads are fully inserted into the instrument before undertaking any testing.
3. Always inspect the condition of the unit before use. If damaged do not use.
4. Only when no voltage exists should either the continuity scale or the insulation resistance scale be selected.

WARNING
The IR750 contains a solid state inverter which produces a voltage of 250V DC, 500V DC or 1000V DC for insulation testing. The instrument must therefore be treated with the necessary respect when the insulation resistance functions are being used.
The voltage present indication will be activated when voltage in excess of 30V and less than 500V is present. If a voltage is present do NOT press the test switch.

Liquid Crystal Display
The liquid crystal display of the IR750 provides additional symbols, a live voltage indication and a low battery indication when the battery condition falls to an unacceptable level. It should be noted that when the insulation resistance scale has been selected, the "Low Bat" sign may illuminate when testing low values of insulation resistance and this should be regarded merely as a warning that high power is being consumed from the internal batteries and that the user should avoid continuous testing under these conditions.

Battery Life
For long battery life it is recommended that the unit is switched off when not in use.

Battery Installation
Four LR6 alkaline type batteries should be fitted into the base of the instrument and these should be replaced where necessary with batteries of similar type.
NOTE: Before removing the battery cover, the test leads MUST be removed from the unit for safety reasons and the unit must be switched off.

Cleaning A non-wetting, non-abrasive material should be used.

Test Leads
Before any test always check the condition of the test leads by:
a) inspecting for any signs of damage to the insulation or breakage to the internal conductors.
b) inserting the red test lead into the red terminal socket of the instrument and the black test lead into the black terminal socket and bringing the test lead probes or clips together. On rotating the rotary switch to the 20Ω position, and pressing test switch, a low resistance reading should be obtained. A high resistance reading or the over-range symbol requires investigation. The connections and the state of the test leads should be checked initially.

Insulation Resistance Measurement
Ensure that the circuit under test is de-energised. Connect the test leads to the instrument and check their condition by the procedure detailed under **Test Leads.**
Select the MΩ range.
Connect the test leads to the terminals of the circuit to be tested. If the instrument indicates that volts are present do not proceed with the test. When no voltage is indicated, pressing the test switch will indicate an insulation resistance measurement from 0-1999MΩ on the display at a test voltage of 1000V DC if the MΩ (1.0kV) position has been selected, 500V DC test voltage at the MΩ (500V) setting or 250V DC test voltage at the MΩ 250V setting.

Resistance values greater than 1999MΩ will generate an over-range indication of a blank display and the digit '1'. An auto-ranging circuit in the IR750 ensures maximum resolution of reading on the MΩ insulation resistance scales by changing range at low MΩ readings.

The IR750 contains a discharge path which will discharge a capacitive circuit after insulation testing.

Continuity Measurement
Ensure that the circuit under test is de-energised.
Connect the test leads to the instrument and check their condition by the procedure detailed under **Test Leads**.
Select the 20Ω range.
Connect the leads to the circuit to be tested. (If volts are present, unit will give audible warning and change to voltage indication mode and display will indicate the voltage.) When no voltage is indicated press the test switch, the display will now show the resistance of the circuit under test plus the resistance of the test leads.

Lead Adjust Facility
When on 20Ω range there is a feature for the unit to account for the resistance of the test leads. To operate, short the ends of the test leads together, press the test switch, display will show the resistance of the leads, now press the lead adjust switch. Display should now show c.0Ω. Lead adjust may not zero exactly first time, if this is the case repeat the above procedure. Any resistance measurements will now be those of the circuit under test. This facility will be turned off when another range is selected.
Resistance readings up to 19.99 ohms can be obtained on the display. Any resistance above this figure will generate an over-range indication of a blank display and the digit '1'.
In such circumstances the instrument should be used on the 2KΩ range.
When a resistance of less than 1000 ohms is encountered, on the 2KΩ range, the instrument will produce an audio bleep. This auto continuity sounder provides rapid continuity checking.

NOTE:
1) DO NOT PROCEED TO CONTINUITY OR INSULATION RESISTANCE TESTING IF THE VOLTAGE INDICATION IS ACTIVATED.
2) THIS INSTRUMENT IS PROTECTED BY FUSES WHICH MAY RUPTURE IF THESE OPERATING INSTRUCTIONS ARE NOT FOLLOWED.
3) NO ATTEMPT SHOULD BE MADE TO DISMANTLE THE INSTRUMENT.
4) AFTER APPROXIMATELY 15 MINUTES THE IR750 WILL ENTER AUTO SHUT OFF MODE TO PROLONG BATTERY LIFE, SWITCH TO OFF POSITION TO RE-SET. ALLOW 5 SECONDS FOR THE AUTO SHUT OFF CIRCUITRY TO RE-SET.
5) THE LEAD ADJUST FEATURE HAS A PRECISION OF 10mΩ. AFTER USING THIS FEATURE IT WILL NOT BE UNCOMMON FOR A SUBSEQUENT CHECK TO INDICATE A SLIGHTLY DIFFERENT READING. THIS WILL BE DUE TO A SMALL CHANGE IN THE CONTACT RESISTANCE OF THE SHORTED LEADS.
6) IF REPAIR IS NECESSARY IT SHOULD BE RETURNED TO: SEAWARD ELECTRONIC LIMITED. (ADDRESS ON FRONT COVER).

IEE Wiring Regulations
Test requirements, for Continuity and Insulation Resistance measurements, as defined in the guidance notes to the 16th Edition IEE Wiring Regulations are summarised as follows:

Continuity of Ring Circuit Conductors-Regulation
The aspect to be noted in this test is that although the Regulation concerned calls for the continuity of all conductors in a ring to be verified to ensure that there are no interconnecting multiple loops the suggested method of testing requires a measurement to be undertaken.

METHOD
a) Temporarily connect a phase conductor of one leg of the ring and the neutral conductor of the other leg.
b) Measure the resistance between the remaining (ie; inward phase and outward neutral) phase and neutral conductors.
c) A finite reading will confirm no open circuit on the ring conductors under test.

d) Temporarily bridge the remaining phase/neutral conductors.
e) Measure and note the resistance between phase and neutral contacts at each socket outlet around the ring.
f) The readings should be substantially the same provided no multiple loops exist.
g) Where the protective conductor is in the form of a ring, carry out the procedure in (a) above but for "neutral" conductor read "protective" conductor.
h) Measure the resistance between the remaining live conductor and the remaining unconnected circuit protective conductor at the origin of the circuit.
i) A finite reading confirms no open circuit.
j) Temporarily bridge the remaining circuit protective conductor and live conductor.
k) Measure the resistance between the circuit protective conductor and live conductor contacts at each socket outlet around the ring.
l) The readings (equal to (R1 and R2) for the circuit) should be substantially the same provided no multiple loop present.
NOTE: R1 is the phase conductor and R2 is the protective conductor.

Continuity of Protective Conductors-Regulation
This regulation requires every protective conductor to be separately tested to verify that it is electrically sound and correctly connected.

It should be noted that:
a) That any extraneous conductive part used for equipotential bonding shall be included in this test.
b) That the test should not only be carried out before the supply is connected but also before any other test involving these conductors is made. The source of energy for the test instrument should therefore be from an alternative source, e.g. a battery.
c) The resistance of the protective conductor is required if the method, defined in Regulation 413-02-12 of limiting the impedance of the protective conductor to the values in Table 41C, is employed to meet the required disconnection times.

Method 1 - Strap phase and protective conductor at the Distribution Board and test between phase and earth terminals at each outlet in the circuit.
Method 2 - With one terminal of the tester connected to the installation's earth terminal and a test lead connected to the other terminal of the tester, obtain resistance measurements by making contact with the protective conductor at various points on the circuit, e.g. lighting fittings, switches etc. The resistance of the test leads should be deducted from any resistance readings obtained.

Insulation Resistance Regulation
The Regulation requires the insulation resistance of conductors and electrical accessories to be measured to verify their compliance within defined standards and that electrical conductors or protective conductors are not short circuited.
The Regulation details;
a) The need to isolate voltage sensitive devices in order that they are not damaged by the test values.
b) The requirement to disconnect pilot or indicator lamps and capacitors to avoid inaccurate test values.
c) That all fuses should be in place, lamps removed and switches closed.
d) That all resistance readings obtained must not be less than the minimum values as detailed in the following table.

MINIMUM VALUES OF INSULATION RESISTANCE

Circuit nominal Voltage	Test Voltage DC	Minimum Insulation Resistance (M ohms)
Extra low voltage circuits when the circuit is supplied from a safety isolating transformer.	250	0.25
Up to and including 500V with the exception of the above.	500	0.5
Over 500V up to 1000V	1000	1.0
Between SELV circuits & associated LV circuits	500	5.0
Additional withstand test if required e.g. Uo 240V	3750 rms AC for 1 minute	

TEST METHODS

	At appropriate switchboard	
	Single Phase	Three Phase
1) Insulation Resistance between live conductors	Test between phase and neutral conductors	Test between: Phase 1 to Phase 2, Phase 3, Neutral Phase 2 to Phase 3, Neutral Phase 3 to Neutral (either singly or grouped)
2) Insulation Resistance to earth	Test between phase and neutral conductors & earth	Test between all conductors bunched with the neutral & earth, or test separately between each conductor to earth where low readings are obtained.

SPECIFICATION
Seaward IR750 Insulation/Continuity Tester

	Range	Accuracy @ 20 °C	Terminal Voltage
Insulation Resistance	0-1999MΩ with auto-ranging selection test voltages of 250V, 500V & 1000V	+/- 2% +/- 2 digit on MΩ range (0-100MΩ)	250V + 20% -0% at 0.25MΩ 500V + 20% -0% at 0.5MΩ 1000V + 20% -0% at 1.0MΩ
Continuity	0-19.99Ω 0-2KΩ	+/- 2% +/- 2 digits	4.5 - 6.5V o.c. 200mA s/c
Voltage Indication	30-500V ac/dc		
Continuity Sounder	Audible indication of resistance below c. 1000 ohms on 2KΩ Range		
Lead Adjust	0-4Ω	+/- 0.05 ohm +/- 2 digit.	

Power Supply
4 x 1.5V alkaline type batteries (IEC No LR6).

Safety Features
Voltage mode indicates the presence of external voltage in excess of approximately 30V. Fuse protection for internal faults. Capacitive circuits automatically discharged when push switch is released.
Voltage Range Maximum 500V AC.

	Operation	**Storage**
Temp. Range	0 °C to 40°C	-20°C to 70°C
Humidity	75% Relative Humidity	90% Relative Humidity @ 40°C
	Maximum up to 35°C	Max. up to 35°C
Temp Coeff	0.1% per °C	

The minimum range of environmental conditions for which the equipment is designed, is as follows;

- indoor use
- altitude up to 2000M
- installation category II
- pollution degree 2

Size: 200mm x 95mm x 55mm Weight: 500 grammes
Additional Feature: Momentary test switch
Automatic low battery indicator
Robust case-High Impact ABS

Fuses: 250mA 20mm IEC 127/F, 500mA 1¼" 600V HRC

Fuses should only be replaced by the same type and rating.