TRIO

Operating Instructions

SAFE*T*CHECK MKD

Test and Measurement Solutions

SAFE*T*CHECK is designed and manufactured in South Australia to comply with the Australian Standard AS/NZS 3760 (In-service safety inspection and testing of electrical equipment). You can test the safety of Class 1 (protectively earthed) appliances, Class 2 (double insulated) appliances and extension leads efficiently. There is no interpretation, no ambiguity just a simple PASS or FAIL reading. SAFE*T*CHECK is self-checking and automatically tests its own operation, assuring the operator of the validity of the results indicated.

N2068

Contents

3 Function and basic technical specification
4 Appliances/tools tested by SAFE*T*CHECK MKD
4 Frequency of electrical safety testing
OPERATING INSTRUCTIONS
5 Preparation of the appliance prior to safety testing
6 Operating SAFE*T*CHECK MKD
6 Safety testing earthed appliances
8 Safety testing double insulated appliances
11 Safety testing extension leads
11 Safety testing appliance couplers

Introduction

The SAFE*T*CHECK MKD appliance safety tester is a micro-processor based instrument used to verify the electrical safety of a large range of 240V 50Hz single phase electrical equipment.

The SAFE*T*CHECK MKD selects the appropriate test thresholds for the selected appliance, checks the insulation resistance, electrical continuity and earth continuity (where appropriate) against pre-determined specification limits. All tests are conducted simultaneously on the principal that if any test(s) should fail the instrument will indicate FAIL on the PASS/FAIL meter, the discrete red fault L.E.D will indicate the fault condition(s) and the audible error alarm will sound.

The SAFE*T*CHECK MKD incorporates 'SELF CHECKING' for controlling software, measurement circuit functions and the operator selections against the appliance characteristics and is designed to be 'FAIL-SAFE'.

The SAFE*T*CHECK MKD complies with the safety testing requirements described by Australian Standard for *In-Service safety inspection and testing of electrical equipment*.

Function and basic technical specification

Earthed appliances are tested for:

> Insulation resistance	1 Meg Ohm	Threshold
> Earth circuit continuity	0.2 Ohm	Threshold
> Electrical continuity	100K Ohm	Threshold

Double insulated appliances are tested for:

> Correct test environment	(Conductive bandage connection)	
> Insulation resistance	10 Meg Ohm	Threshold
> Electrical continuity	100K Ohm	Threshold

Extension cords are tested for:

> Insulation resistance	1 Meg Ohm	Threshold
> Earth circuit continuity	1.0 Ohm	Threshold
> Electrical continuity of active & neutral conductors	Leakage or short circuit between active & neutral conductors 10K Ohm nominal	
> Connection polarity	(Transportation of active & neutral)	

Test duration
3.5 seconds

Electrical stress test parameters

Insulation	500V D.C
Earth circuit	25A 50Hz nominal 5V underload / 20V open circuit

Display

Indicator meter scaled

Red	–	Fail
White	–	Check
Green	–	Pass

Selection
Green L.E.D.'s

Faults
Red L.E.D.'s
Annunciated via audible "BEEPS"

Power requirements
240V +/- 10% 50Hz

Test inlets
Flush mounted plug (flush extension lead inlet socket) is protected against accidental application of 240V 50Hz mains voltage.

Operating instructions
Step by step operating instructions permanently on instrument front panel, incorporated in 6 colour multilayer LEXAN membrane keypad.

Warranty period
12 months from date of purchase

Calibration period
Recommended every 12 months

Repairs and calibration
We recommend the SAFE*T*CHECK MKD be returned to an authorised service centre for repair or regular calibration. In doing so you are assured any recent enhancements to the hardware and/or software applicable to your SAFE*T*CHECK MKD will be included in the repair or calibration as a matter of policy - at no extra cost. Check with Trio for your closest authorised service centre.

Accessories

Test lead (E)
(for earthed appliance testing)
1 metre green/yellow 2.5mm^2 fitted with terminating lug and spring loaded earthing clamp.

Power cord
standard 2 metre moulded lead set (E.T.S.A. approved).

Test lead (D)
(for double insulated appliance testing).
1 metre blue 2.5mm^2 fitted with 4mm banana plug and spring loaded connection clip.

Conductive bandage
2 metre x 25mm length of woven tinned copper braid.

Note: We reserve the right to change the specifications at any time without notice

Appliances/tools tested by the SAFE*T*CHECK MKD

The **SAFE*T*CHECK MKD** will test a large range of 240V 50Hz single phase electrical equipment, including portable and fixed appliances. If in doubt as to the suitability of the appliance tester to verify the electrical safety of a particular tool/appliance under test, please refer to the manufacturer:

Trio Electrix Pty. Ltd.
10 James Street Thebarton
South Australia 5031
Telephone 61 8 8234 0504
Facsimile 61 8 8234 0130

The **SAFE*T*CHECK MKD** is not designed to verify the electrical safety aspect of General Purpose Outlets (G.P.O.s), Residual Current Devices (R.C.D.s) or Safety Isolation Transformers.

Frequency of electrical safety testing

(Guide only)

The minimum recommended frequency of safety testing of electrical equipment is specified in Australia Standard for in service testing AS/NZS 3760

Type of environment in which equipment is used	Earthed appliance	Double insulated appliance	Extension cords
Factories, shops & places of work manufacturing, repair, maintenance or construction	6 months	12 months	6 months
Office environment where equipment is not subject to constant flexing of the supply cord	5 years	5 years	12 months
Other commercial environments, e.g. tea rooms, office, kitchens, health care studios, with no protection	12 months	12 months	6 months
Construction and Demolition sites	3 months	3 months	3 months
Hire equipment	Before each hire	Before each hire	Before each hire

Preparation of the appliance prior to safety testing

General visual inspection

1 Ensure the appliance to be safety tested has no obvious mechanical faults and is free from external damage.

2 Inspect the supply lead for any damage, defects or loose terminals in the accessories, connectors, plugs or outlet sockets. Common faults encountered:

a) Frayed or damaged supply lead.

b) Exposed conductors and/or covered by insulation tape.

c) Abrasions in the outside insulation jacket.

d) Supply lead anchorage at plug or appliance entry.

3 Check that any controls, alarms and replaceable protective devices accessible to the operator, are of correct rating and in good working order.

4 Inspect all switches and speed controls for mechanical operation; ensure switches and controls are clear of any obstruction, e.g. filings, swarf, metal particles, grease, etc.

5 Confirm all identity tags/labels etc. pertaining to the frequency of safety testing are correctly attached and records of all test/inspections are kept to ensure the safety integrity and history of the appliance.

6 Unroll extension leads/rolls and inspect as above.

Identify the appliance to be tested

Examine the appliance to be tested and identify whether the appliance is an earthed appliance, a double insulated appliance, or an extension cord.

Earthed appliances should always have an earth pin on their plug, and will normally have exposed metal components.

Double insulated appliances may be identified by the double insulation ⧈ symbol, and/or by the absence (i.e. not broken off) of an earth pin on a moulded socket.

NOTE: Many double insulated tools are colour coded blue.

NOTE: If any doubt exists about the design type of an appliance, the appliance should be tested as an earthed appliance.

Preparation of an earthed appliance to be safety tested

1 Switch any/all switches 'ON'.

2 Set any speed control to 'FULL ON' (Maximum speed).

3 Preparation for earthed appliance to be safety tested is now complete and may be connected to the SAFE*T*CHECK MKD
(see Safety Testing Earthed Appliances – page 6)

Preparation of a double insulated appliance to be safety tested

1 Switch any/all switches 'ON'.

2 Set any speed control to 'FULL ON' (Maximum speed).

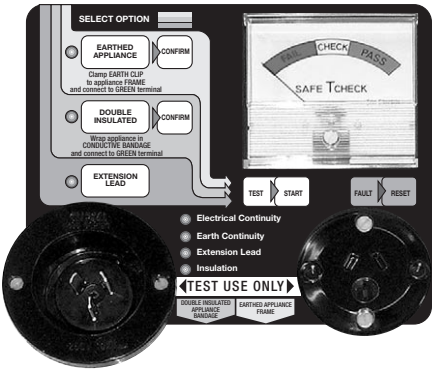
3 Preparation for double insulated appliance to be safety tested requires the appliance to be wrapped in a conductive bandage taking care to make contact with all metal components and the exterior of the appliance where hand contact is normally possible.

3 Preparation for double insulated appliance to be safety tested is now complete and may be connected to the SAFE*T*CHECK MKD
(see Safety Testing Double Insulated Appliances – page 8)

WARNING

Upon completion of a successful safety test and removal of test lead and/or conductive bandage, please ensure all switches/speed controls are returned to their 'OFF' position.

Operating SAFE*T*CHECK



Place SAFE*T*CHECK MKD on a convenient non-conductive working surface. Plug the power cord into SAFE*T*CHECK MKD receptical at the rear of the unit and connect plug to the 240V 50Hz supply. Switch the 240V 50Hz supply 'ON'.

With 240V 50Hz applied to the SAFE*T*CHECK MKD the unit will perform a 'SELF-CHECK ROUTINE' in the central micro-processor setting up the following conditions.

1. Meter will assume the centre scale position labeled 'CHECK'.
2. All the L.E.D. indicators will illuminate.
3. The three selection L.E.D indicators will be 'FLASHING' indicating the selection options available to the operator. The SAFE*T*CHECK MKD will continue to self test.
4. The SAFE*T*CHECK MKD is now ready to perform appliance safety testing.

Any departure from these conditions will render the SAFETCHECK MKD unusable, and should be returned for repair.

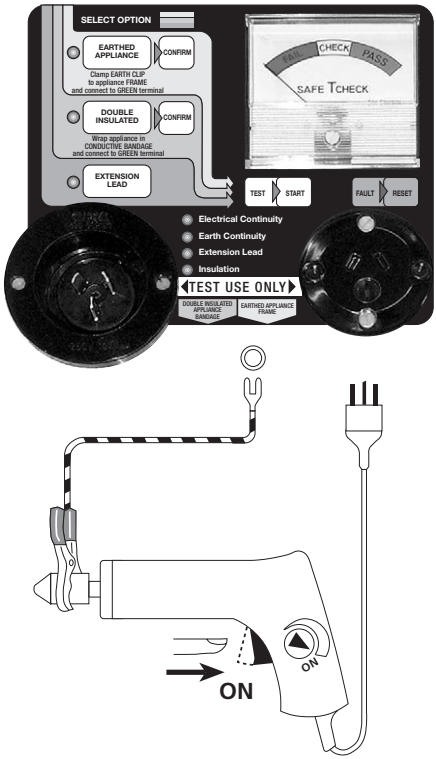
Safety testing earthed appliances

1. Ensure the SAFE-T-CHECK is in the self test mode i.e. meter reads 'CHECK'.
2. Plug the appliance to be tested into the socket labeled TEST USE ONLY provided on the front panel of the SAFE-T-CHECK MKD.

Note: The appliance must be connected directly and not via an extension lead.

Note: If an earthed appliance is fitted with a very long lead it may fail the earth continuity test because of excessive earth lead resistance.

3. Connect the GREEN earthing lead to the unit via the green terminal.
4. Connect the GREEN earthing lead to a convenient metal (conductive) portion of the appliance under test.



If any earthed appliance has one or more metal component(s) which are possibly not connected together, the overall test must be repeated with the EARTH clamp connected to each metal component in turn.

5 Switch the appliance to be tested 'ON'
N.B. Any/all switches must be 'ON' to ensure electrical continuity into the internal windings.

6 If the appliance to be tested has a variable speed control fitted, turn the control fully 'ON' or to the highest speed, this will connect Active/Neutral direct to the internal windings.

7 Select EARTHED APPLIANCE testing parameters by pressing the membrane pad in the green/yellow section of the graphic membrane panel. Upon this selection the SAFE-T-CHECK MKD will automatically set up test parameter thresholds to test earth appliances.

Previously flashing L.E.D.'s will extinguish. The 'CONFIRM' L.E.D. will commence flashing.

8 Confirm the connection of the green earth lead to the tester and the appliance under test by pressing the confirm membrane pad. Previously flashing confirm L.E.D. will extinguish. The 'START TEST L.E.D.' will commence flashing.

9 START tests by pressing the START membrane pad.

The test L.E.D. will stop flashing and will illuminate continuously during the test cycle. During testing cycle the operator may apply stress to the appliance supply lead and plug in order to detect any intermittent faults.

10 TEST RESULTS will be indicated via –

a) Meter indication 'PASS' or 'FAIL'

b) Fault indication L.E.D. (Red)

c) Audible annunciator

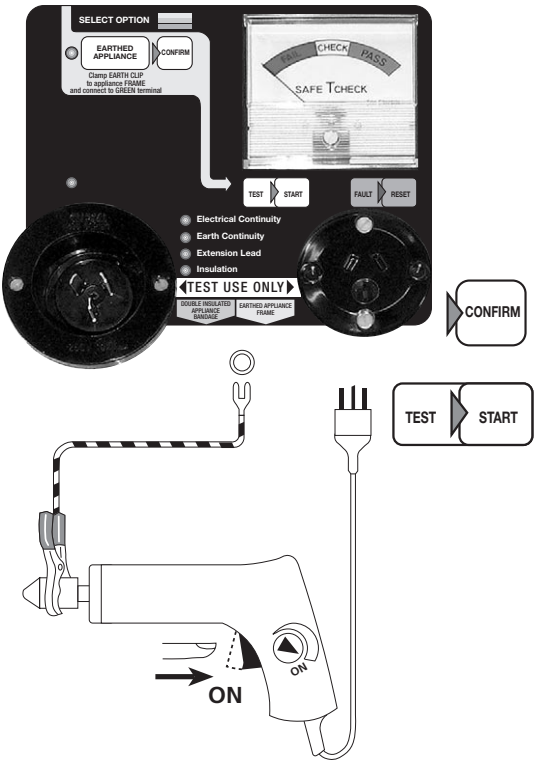
WARNING

To avoid uncertain results when testing an earthed appliance, ensure that:

1 The earth clip is securely attached to the metal frame.

2 It has been disconnected from all other equipment.

3 The test is conducted on an insulated (not metal) benchtop.



Safety testing double insulated appliances

Evaluation of in-service testing results for earthed appliances

Where the SAFE*T*CHECK MKD identifies an appliance/tool which fails to comply with the test criteria the equipment shall be:

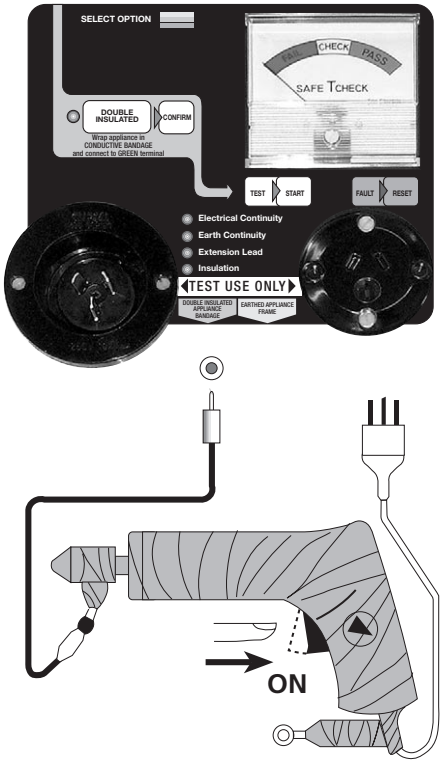
1 Withdrawn from service immediately and have a label attached to it warning against further use.

2 Repaired by the appropriately qualified person and retested after repair.

3 Refit test identity tags/labels etc. and log test in safety history records.

WARNING

Upon completion of a successful safety test and removal of test lead and/or conductive bandage, please ensure all switches/speed controls are returned to their 'OFF' position.



1 Ensure the SAFE*T*CHECK MKD is in the self test mode, i.e. Meter reads 'CHECK'.

2 Plug the double insulated appliance to be tested into the socket labeled TEST USE ONLY provided on the front panel of the SAFE*T*CHECK MKD.

Note: The appliance must be plugged in directly, and not via extension leads.

3 Switch the appliance to be tested 'ON'. N.B. Any/all switches must be 'ON' to ensure electrical continuity into the internal windings.

4 If the appliance to be tested has a variable speed control fitted, turn the control fully 'ON' or to the highest speed, this will connect Active/Neutral direct to the internal windings.

5 Wrap the appliance in a conductive bandage, taking care to make contact with all metal components and the exterior of the appliance where human hand contact is normally possible.

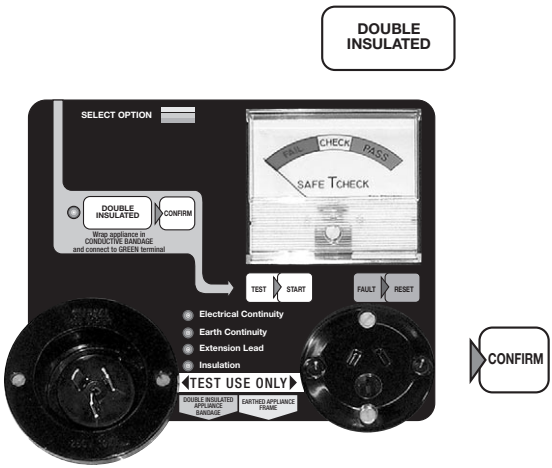
The conductive bandage may be woven metal cloth mesh, conductive braid, aluminium foil, or other suitable flexible conductor with low resistance (less than 100ohms).

Note: The wrapped appliance should be on an insulated bench to avoid earthing the measurement circuit in the SAFE*T*CHECK MKD.

6 Connect the conductive bandage to the 'BLUE' socket for DOUBLE INSULATED APPLIANCES on the SAFE*T*CHECK MKD.

7 Select Double Insulated test by pressing the membrane pad in the BLUE section of the graphic membrane panel.

Upon this selection command, the SAFE*T*CHECK MKD will automatically set up test parameters to test double insulated appliances. Previously flashing select L.E.D.'s will extinguish. The 'CONFIRM L.E.D.' will commence flashing.



8 Confirm the connection of the conductive bandage wrapped around the appliance under test to the SAFE*T*CHECK MKD by pressing the confirm membrane pad.

The SAFE*T*CHECK MKD will check that the conductive bandage and connecting lead is correctly applied, since the correct establishment of the test environment is vital to the correct verification of insulation resistance in a double insulated appliance.

The verification of a correctly wrapped and connected conductive bandage is made by the SAFE*T*CHECK MKD by measuring the capacitance between the electrical circuit in the double insulation appliance and the conductive bandage.

If the verification test passes, the L.E.D. indicator will show steady illumination and the START TEST L.E.D. will flash prompting the next sequence of the test.

Failure of this verification for double insulation appliances may be for one or more of the following reasons:

a) The double insulated appliance is not correctly wrapped or connected to the 'BLUE' socket for double insulated appliances.

b) The assumed double insulated appliance is in fact, an earthed appliance and the incorrect identification and/or an incorrect test selection has been made.

c) The double insulated appliance is connected to the SAFE*T*CHECK MKD via an extension cord.

d) The appliance is earthed via another path such as a metal earthed bench.

Safety testing double insulated appliances

e) Both active (A) and neutral (N) leads are open circuited in the appliance. E.g. failure to turn 'ON' appliance switch(es).

f) The resistance of the conductive bandage around the appliance is too high.

g) The appliance has extremely low inherent capacitance between the external surface and the internal electrical circuit. This may apply to some very small appliances with minimum internal circuitry e.g. a plastic bedlamp.

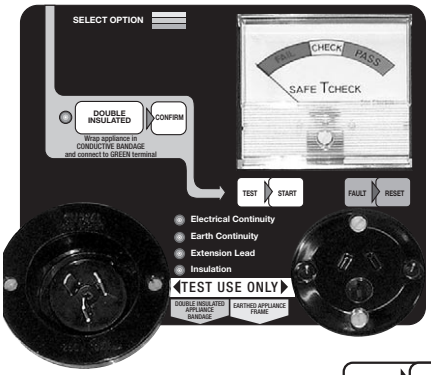
9 START tests by pressing the START membrane pad. The test L.E.D. will stop flashing and will illuminate continuously during the test cycle. During the testing cycle the operator may apply stress to the appliance supply lead and plug in order to detect any intermittent faults.

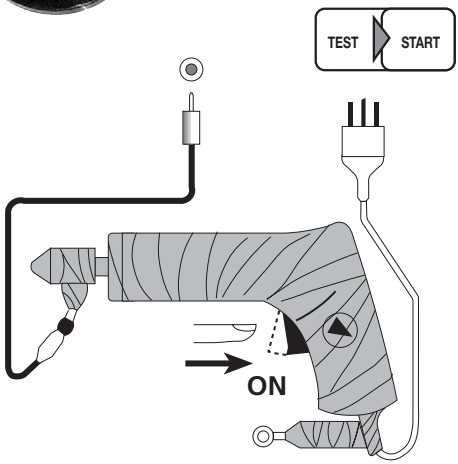
Test results will be indicated via –

a) Meter indication 'PASS' or 'FAIL'

b) Fault indication L.E.D. (Red)

c) Audible annunciator





Evaluation of in-service testing results

Where the SAFE*T*CHECK MKD identifies an appliance/tool which fails to comply with the test criteria the equipment shall be –

1 Withdrawn from service immediately and have a label attached to it warning against further use.

2 Repaired by the appropriately qualified person and retested after repair.

3 Refit test identity tags/labels etc. and log test in Safety history records.

WARNING

Upon completion of a successful safety test and removal of test lead and /or conductive bandage, please ensure all switches/speed controls are returned to their 'OFF' position.

Safety testing extension leads

1 Ensure the **SAFE*T*CHECK MKD** is in the self test mode, i.e. meter reads 'CHECK'.

2 Plug the extension lead into the plug and socket labelled TEST USE ONLY provided on the front panel of the **SAFE*T*CHECK MKD**

3 Select EXTENSION LEAD Test by pressing the membrane pad in the ORANGE section of the graphic membrane panel. Upon this selection command, the **SAFE*T*CHECK MKD** will automatically set up test parameters to test extensions leads and change the Earth threshold set point from 0.2 to 1.0 ohm.

4 Previously flashing select L.E.D.'s will extinguish, and the start test indicating L.E.D. will be flashing, thus prompting the operator to the next step.

5 START tests by pressing the START membrane pad. The test L.E.D. will stop flashing and will illuminate continuously during the test cycle. During the testing cycle the operator may apply stress to the lead and plug in order to detect any intermittent faults.

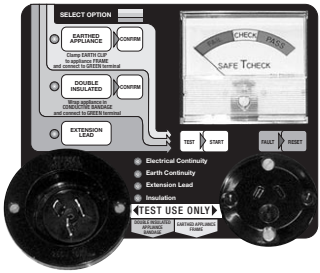
6 Test results will be indicated via –

a) Meter indication 'PASS' or 'FAIL'

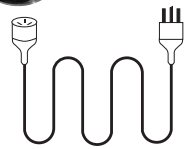
b) Fault indication L.E.D. (Red)

c) Audible annunciator.

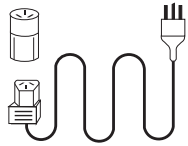
Note: If the extension lead has a fixed socket (as in extension reels), this must be connected to the fixed test plug on the **SAFE*T*CHECK MKD** with a short TEST extension lead of rated voltage and current, which has been previously tested and verified SAFE. Normally, extension leads must be tested individually and not cascaded.



EXTENSION LEAD



TEST ▶ **START**



Safety testing appliance couplers

1 Appliance couplers are safety tested normally connected to their associated appliance and are tested as an EARTHED APPLIANCE

2 Appliance couplers are safety tested using an appliance coupler adaptor plugged into the test plug (flush-extension inlet socket) and are tested as extension leads.

Trio Electrix Pty Ltd
ABN 81 053 634 182

Adelaide
10 James Street,
Thebarton SA 5031
Phone 08 8234 0504
Fax 08 8234 0130

Sydney
Nirimba Educational Precinct
Building T2A Eastern Road
Quakers Hill NSW 2763
Phone 02 9853 3231
Fax 02 9853 3234

Melbourne
5/16-18 Croydon Road
Croydon VIC 3136
Phone 03 9723 7123
Fax 03 9723 8321

Brisbane
P.O. Box 177
Springwood Qld 4127
Phone 07 3808 1700
Fax 07 3808 7022

ISO 9001:2000

www.trio-electrix.com.au