

CABPAT



OPERATING INSTRUCTIONS

Contents

1. Important Information	3
2. Introduction	5
3. Performing Tests	7
3.1. Testing a Class I Appliance	7
3.2. Testing a Class I Appliance with Leakage	9
3.3. Testing a Class II Appliance	11
3.4. Testing a Class II Appliance with Leakage	12
3.5. Testing a mains cord	14
3.6. Testing an extension lead	15
3.7 a. Test an EPOD (Powerboard)	16
3.7 b. Test an EPOD/Extension Lead with MOV and/or RCDs	17
4. Troubleshooting	20
5. Specification	21
6. Maintenance	22
7. Battery Check	23
7.1. Battery Replacement	23
8. Fuse	24
8.1. Fuse Replacement	24
9. Service and Calibration	25

1 Important Information

These operating instructions are intended for the use of adequately trained personnel.

The following symbols are used in these operating instructions and on the CABPAT.



Caution, risk of electric shock.

Indicates instructions must be followed to avoid danger to persons.



Caution, risk of danger. The operating instructions must be adhered to in order to avoid danger.



Caution, risk of electric shock.

Always ensure that the equipment under test is disconnected from any supply before connecting to the tester.

It is the responsibility of the user to ensure that the operation of the unit is correct and that the accuracy of the measurements are within specification.

Before use, ensure unit is clean and dry; visually inspect all leads, connectors and case. Any damage or wear must be rectified prior to use.

Standard Accessories

	Part Number
Mains Supply Test lead	44B165
Black Test Leads 1m	347A002
Australian IED mains cord 0.5m	325A005

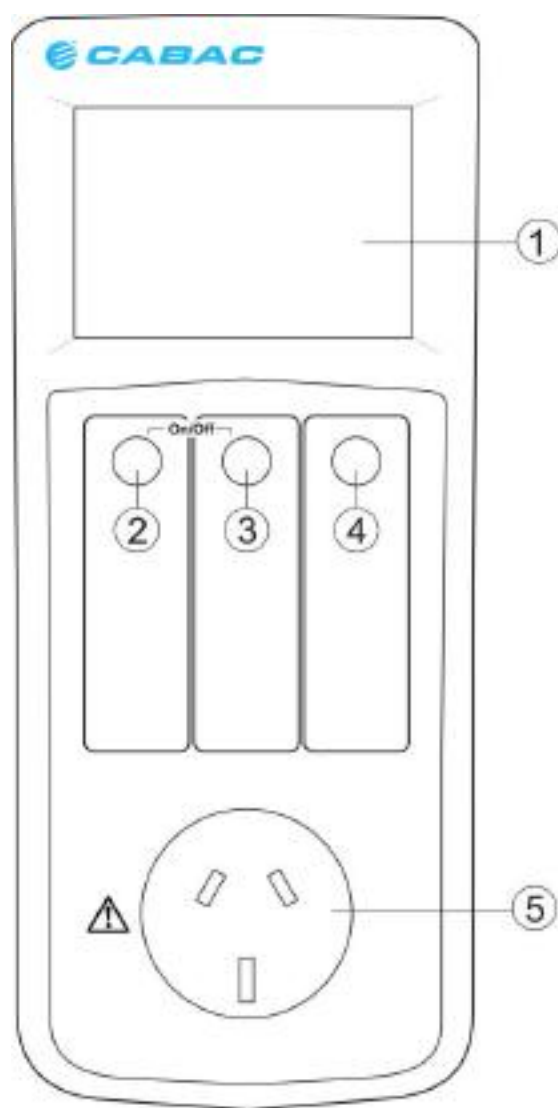


Figure 1. CABPAT Front View

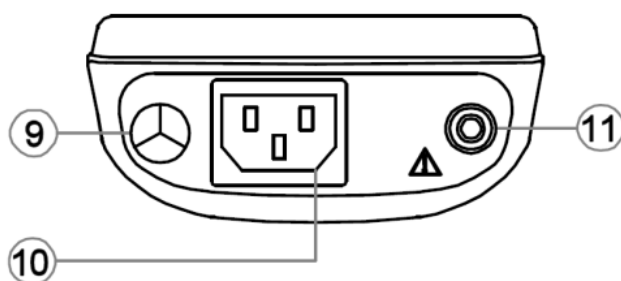


Figure 2. CABPAT End View

2 Introduction

The CABPAT is a hand held battery powered unit suitable for carrying out electrical safety checks on:

- Class I appliances
- Class II appliances
- IEC mains leads
- Extension leads

Overview

With reference to Figures 1 and 2.

1. The LCD
2. CL I Test / Cord Sequence Button
3. CL II Test Sequence Button
4. Leakage Test Sequence Button
5. Test/Mains outlet socket
9. Mains inlet socket
10. IEC Test Connection
11. Earth/Insulation Test Terminal

User Interface

The LCD display shows test progress, results for individual tests and the overall test result for an appliance or mains cord.

Measurements displayed next to the RPE icon indicate the resistance of the protective earth conductor.

Measurements displayed next to the RISO icon indicate the resistance measured by the insulation test.

Measurements displayed next to the ILEAK icon indicate the leakage current measured while the appliance under test is powered from the mains supply at the tester mains outlet socket.

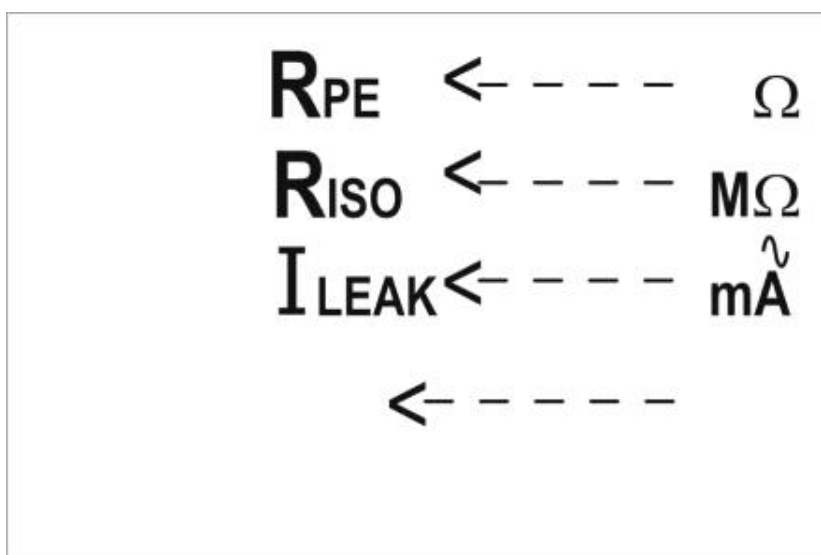
Tests are initiated using the three push buttons.

Power ON/OFF = press and hold the CL I and CL II test buttons simultaneously, CABPAT will power on/off when buttons are released.

Note: The unit will automatically switch OFF after approximately 3 minutes if no keys are pressed.

3 Performing Tests

Press keys CL I and CL II test buttons together to switch on the unit. When the unit is ready the display will be as shown below.



3.1 Testing a Class I Appliance

Visually inspect the appliance as per requirements of AS/NZS3760. If the appliance passes a visual inspection proceed with the electrical tests.

Plug the black test lead into the Earth/Insulation test terminal on the CABPAT end panel.

Plug the appliance into the CABPAT front panel test socket.

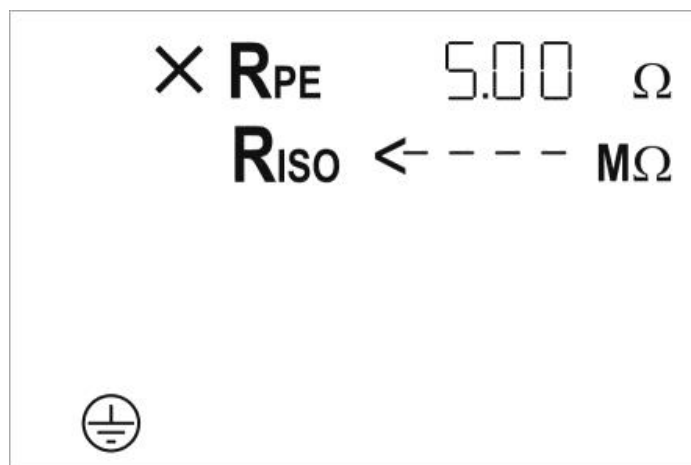
Connect the black test probe to an exposed metal part on the appliance.

If the Appliance under test has an ON/OFF switch, make sure it is in the ON position.

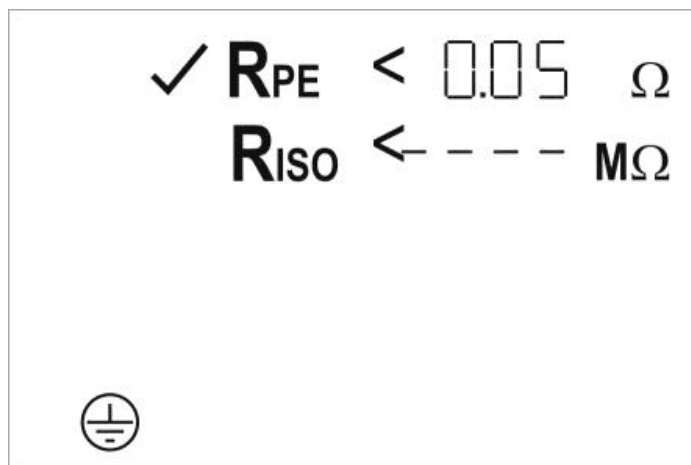
Press the CL I test button to start a Class I test sequence.

The CABPAT will now test the continuity of the protective earth.

If the measured value is greater than the 1 ohm pass/fail threshold, the measured value is displayed and the unit indicates a fail result as shown below.



If the measured value is less than or equal to the 1 ohm pass/fail threshold, the measured value is displayed and the unit indicates a pass result, as shown below.



If the Earth Continuity test has passed then the unit will proceed with an Insulation test.

Note: The power switch on the appliance under test must be in the ON position to perform an insulation test. If no appliance is detected the CABPAT will display LO LOAD.

If the LO LOAD enunciator is displayed, the load presented by the appliance may be too small for the CABPAT to detect. In this case, press the CL I test button to continue.

If the Insulation test measures below the 1Mohm pass/fail threshold, the measured value is displayed and the unit indicates a fail.

If the measured value is greater than or equal to the 1 Mohm pass/fail threshold, the measured value is displayed and the unit indicates a pass result.

3.2 Testing a Class I Appliance with Leakage

Visually inspect the appliance as per requirements of AS/NZS3760. If the appliance passes a visual inspection proceed with the electrical tests.

Plug the mains lead into the CABPAT and a mains supply socket.



When plugging the mains lead into the CABPAT ensure that the polarity orientation of the connector is correct. DO NOT FORCE THE PLUG INTO THE CONNECTOR, doing so may damage the CABPAT.

Plug the black test lead into the Earth/Insulation test terminal on the CABPAT end panel. Plug the appliance into the CABPAT front panel test socket.

Connect the black test probe to an exposed metal part on the appliance. If the Appliance under test has an ON/OFF switch, make sure it is in the ON position. Press and hold the Leakage button and then the CL I test button. The CABPAT will now test the continuity of the protective earth. If the measured value is greater than the 1 ohm pass/fail threshold, the measured value is displayed and the unit indicates a fail.

If the measured value is less than or equal to the 1ohm pass/fail threshold, the measured value is displayed and the unit indicates a pass result. The unit will proceed with a Leakage test.

Note: The power switch on the appliance under test must be in the ON position to perform a leakage test. If no appliance is detected the CABPAT will display LO LOAD.

The ILEAK icon will flash, press the Leakage button to start a Leakage test.

The mains supply status is checked and the status is indicated using the LN, LE and NE enunciators of the LCD.

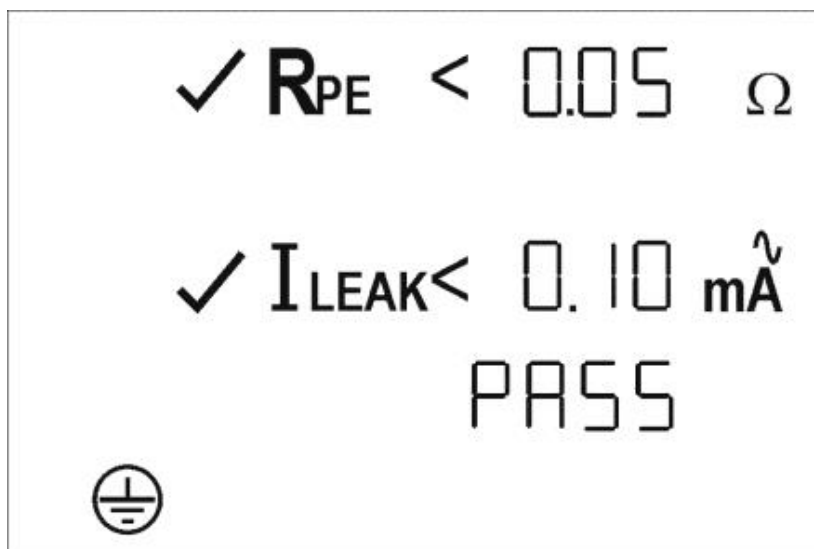
LN	LE	NE	Mains Status
ON	ON	OFF	Correct
Flash	Flash	OFF	No mains
OFF	Flash	Flash	Earth fault
OFF	Flash	Flash	Live/neutral reserved

If the **LO LOAD** enunciator is displayed, the load presented by the appliance may be too small for the CABPAT to detect. In this case, press the Leakage button to continue.

Note: If the High Load enunciator is displayed, the load presented by the appliance may be too great for the CABPAT and users should carry out an insulation test. Continuing with the leakage test may blow the fuse.

If the Leakage current is greater than 5mA the **FAIL** enunciator is illuminated.

If the Leakage current is less than or equal to 5mA a tick is placed next to the ILEAK enunciator. The PASS enunciator is illuminated.



3.3 Testing a Class II Appliance

Visually inspect the appliance as per requirements of AS/NZS3760. If the appliance passes a visual inspection proceed with the electrical tests. Plug the black test lead into the Earth/Insulation test terminal on the CABPAT end panel. Plug the appliance into the CABPAT front panel test socket. Connect the black test probe to an exposed metal part on the appliance.

If the Appliance under test has an ON/OFF switch, make sure it is in the ON position.

Press the CL II test button to start a Class II test sequence.

Note: The power switch on the appliance under test must be in the ON position to perform an insulation test. If no appliance is detected the CABPAT will display LO LOAD.

If the LO LOAD enunciator remains on the display, the load presented by the appliance may be too small for the CABPAT to detect. In this case, press the CL II test button to continue.



The unit will now perform an Insulation test.

If the Insulation Resistance is less than 1Mohm the **FAIL** enunciator is illuminated.

If the Insulation Resistance is greater than or equal to 1Mohm a tick is placed next to the **RISO** enunciator.

The **PASS** enunciator is illuminated.

3.4 Testing a Class II Appliance with Leakage

Visually inspect the appliance as per requirements of AS/NZS3760. If the appliance passes a visual inspection, proceed with the electrical tests.

Plug the mains lead into the CABPAT and a mains supply socket.



When plugging the mains lead into the CABPAT ensure that the polarity orientation of the connector is correct. DO NOT FORCE THE PLUG INTO THE CONNECTOR, doing so may damage the CABPAT.

Plug the black test lead into the Earth/Insulation test terminal on the CABPAT end panel. Plug the appliance into the CABPAT front panel test socket.

Connect the black test probe to an exposed metal part on the appliance.

If the Appliance under test has an ON/OFF switch, make sure it is in the ON position.

Press and hold the Leakage button and then the CL II test button to perform the Class II test sequence including a Leakage test.

Note: The power switch on the appliance under must be in the ON position to perform an leakage test. If no appliance is detected the CABPAT will display LO LOAD.

The ILEAK icon will flash, press the Leakage button to start a Leakage test.

The mains supply status is checked and the status is indicated using the LN, LE and NE enunciators of the LCD.

LN	LE	NE	Mains Status
ON	ON	OFF	Correct
Flash	Flash	OFF	No mains
OFF	Flash	Flash	Earth fault
OFF	Flash	Flash	Live/neutral reserved

If the **LO LOAD** enunciator is displayed, the load presented by the appliance may be too small for the CABPAT to detect. In this case, press the Leakage button to continue.

Note: If the High Load enunciator is displayed, the load presented by the appliance may be too great for the CABPAT and the user should carry out an Insulation test. Continuing with the leakage test may blow the fuse.

If the Leakage current is greater than 1mA the **FAIL** enunciator is illuminated.

If the Leakage current is less than or equal to 1mA a tick is placed next to the ILEAK enunciator.

The **PASS** enunciator is illuminated.

3.5 Testing a mains cord

Visually inspect the appliance as per requirements of AS/NZS3760. If the cord passes a visual inspection proceed with the electrical tests.

Plug the mains cord under test into the IEC socket and the front panel mains socket on the CABPAT.

Press the CL I test sequence button.

The CABPAT will first test the continuity of the protective earth.

If the measured value is greater than 1 ohm a cross is placed next to the RPE enunciator, a **FAIL** is indicated.

If the measured value is less than or equal to 1 ohm a tick is placed next the RPE enunciator.

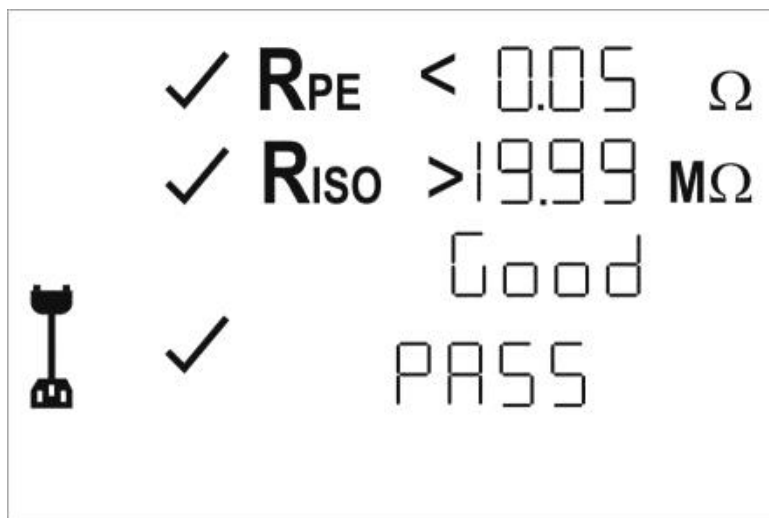
The unit will proceed with the Insulation test.

If the Insulation Resistance is less than 1 Mohm a cross is placed next to the RISO enunciator.

If the Insulation Resistance is greater than or equal to 1 Mohm a tick is placed next to the RISO enunciator.

The unit will proceed with the wiring test, checking the live and neutral conductors for short or open circuits or reversed connections.

If the wiring is correct a tick is placed next to the cord enunciator, the **GOOD** enunciator is illuminated and a **PASS** is indicated for the sequence.



Note: If the tested cord has a wiring fault, one of the following enunciators will be illuminated in place of GOOD

OPEn indicates that either the live or neutral conductor is broken (open circuit) or the plug top fuse has blown

Shrt indicates that the live and neutral conductors are shorted together

CrOS indicates that the live and neutral connections are crossed (live and neutral conductors reversed)

3.6 Testing an extension lead

Visually inspect the appliance as per requirements of AS/NZS3760. If the cord passes a visual inspection proceed with the electrical tests.

Plug the supplied 0.5m IEC lead into the IEC socket and into a mains outlet on the extension lead.

Plug the mains plug of the extension lead into the front panel mains socket on the CABPAT.

The extension lead can now be tested in the same manner as an IEC as described above.

3.7a Test an EPOD (Powerboard)

Visually inspect the appliance as per requirements of AS/NZS3760. If the cord passes a visual inspection proceed with the electrical tests. AS/NZS3760 requires an earth resistance test to be performed to each outlet.

Operators have the choice of carrying out two test sequences for EPODs:

Procedure A: a complete test sequence is carried out for every socket (earth, insulation and polarity)

Procedure B: a complete test sequence is carried out on the very last socket. Only an earth resistance test is carried out on the remaining sockets.

Procedure A:

1. Plug powerboard lead into mains outlet socket on the CABPAT.
2. Plug IEC Lead into the IEC socket on the top of the CABPAT.
3. Plug the IEC Lead plug into the first socket of the EPOD.
4. Press CL I test button to perform a complete test sequence covering earth, insulation and polarity to test the socket.
5. Repeat sequence on every socket.

Procedure B:

1. Plug powerboard lead into mains outlet socket on the CABPAT.
2. Plug IEC Lead into the IEC socket on the top of the CABPAT.
3. Plug the IEC Lead plug into the first socket of the EPOD.

Note: First socket is defined as the closest socket to the power lead.

4. Press the CL I and LKGE buttons simultaneously. The CABPAT an earth test.
5. Repeat step 4 on every socket until the last socket.
6. At the last socket, press the CL I button to do a complete test.

Note: Last socket is defined as the socket furthest from the power lead.

3.7b Test an EPOD/Extension Lead with MOV and/or RCDs

Visually inspect the appliance as per requirements of AS/NZS3760. If the cord passes a visual inspection proceed with the electrical tests. AS/NZS3760 requires an earth resistance test to be performed to each outlet.

This test sequence uses a leakage test to replace an insulation test at 500V DC to avoid triggering the MOV (surge protector) or to apply power to the RCD to allow circuit connections.

Operators have the choice of carrying out two test sequences for EPODs with MOV and/or RCD:

Procedure A: a complete test sequence is carried out for every socket (earth, leakage and polarity)

Procedure B: a complete test sequence is carried out on the very last socket. Only an earth test is carried out on the remaining sockets.

Note: For extension leads with RCDs, follow 3.7b Procedure A and carry out a single socket test.

Procedure A:

1. Plug the mains lead into the CABPAT and a mains supply socket.
2. Plug powerboard lead into mains outlet socket on the CABPAT.
3. Plug IEC Lead into the IEC socket on the top of the PCABPAT.
4. Plug the IEC Lead plug into the first socket of the EPOD.
5. Press the CL1 and LKGE buttons simultaneously. The CABPAT will perform an earth test.
6. The CABPAT will give warning beeps. The user should press the LKGE button to carry out a leakage and polarity test on the socket.
7. Repeat sequence on every socket.

Procedure B:

1. Plug the mains lead into the CABPAT and a mains supply socket.
2. Plug powerboard lead into mains outlet socket on the CABPAT.
3. Plug IEC Lead into the IEC socket on the top of the CABPAT.
4. Plug the IEC Lead plug into the first socket of the EPOD.

Note: First socket is defined as the closest socket to the power lead.

5. Press the CL I and LKGE buttons simultaneously. The CABPAT performs an earth test.
6. The CABPAT will give warning beeps. Press the CL II button to stop the test.
7. Repeat steps 5 and 6 on every socket until the last socket.
8. At the last socket, press the CL I and LKGE buttons simultaneously. The CABPAT forms an earth test.

9. The CABPAT will give warning beeps. Press the LKGE button to carry out a leakage and polarity test on the last socket. This completes the sequence for the powerboard test.

Note: Construction site EPODs usually have 2 banks of outlet sockets. A complete test sequence must be carried out on at least one socket outlet on each bank.

4 Troubleshooting

Q I have attached an IEC lead but the unit does not detect it and performs a Class I test.

A The IEC lead has an open earth path, the lead should be labelled as fail.

Q The CABPAT shows a 'NO LOAD' warning.

A The appliance under test is either not switched on or CABPAT cannot detect that the appliance is connected. Ensure that the appliance is connected correctly and is switched on. Press the CL I button to proceed with a Class I sequence, the CL II button to proceed with a Class II sequence or the Leakage button to proceed with a Leakage test.

Q The CABPAT shows a 'HIGH LOAD' warning.

A The appliance under test is greater than 10A, proceeding with the Leakage test may blow the fuse in the CABPAT. It is suggested that the sequence is aborted and a sequence which include an Insulation test be performed.

Q I have started a test sequence but the IEC icon is flashing.

A The CABPAT has detected an IEC lead.
To test the IEC lead press the CL I button.

5 Specification

Earth Continuity

Display Range	0.01 -19.99 ohms
Measuring Range	0.05 – 19.99 ohms
Accuracy*	± (5% + 2 digits)
Test current	200mA minimum
Test voltage	9V nominal

*When used with Seaward test lead, Part Number 161A024

Insulation resistance

Display Range	0.01 -19.99 Mohms
Measuring Range	0.10 – 19.99 Mohms
Accuracy	± (5% + 2 digits)
Test voltage	500V VDC
Test current	>1mA into 500k
Test current	<2mA into 2k

Class I Leakage Current

Display Range	0.15 – 9.99 mA
Measuring Range	0.25 – 9.99 mA
Accuracy	± (5% + 2 digits)
Test voltage	Mains Supply voltage

Class II Leakage Current

Display Range	0.10 – 5.00 mA
Measuring Range	0.10 – 5.00 mA
Accuracy	± (5% + 2 digits)
Test voltage	Mains Supply voltage

Cord Test

Earth continuity, insulation resistance as above. Check for Live and Neutral open circuit, short circuit or reversed polarity.

Factory Set Pass/Fail limits

	Class I	Class II
Earth Continuity	1.0 ohms	N/A
Insulation Resistance	1.0Mohm	1.0Mohm
Leakage	5.00mA	1.00A

Environmental rating

IP Rating IP40

Operating temperature range 0°C to 40°C, without moisture condensation.

Storage temperature range –25° to 65°.

Note: Batteries should be removed prior to storage.

Overvoltage category 300V CAT II

6 Maintenance


Clean only with a dry cloth; do not use solvents. Before use, ensure unit is clean and dry; visually inspect all leads, connectors, and case. Any damage or wear must be rectified to preserve user safety.


Check the battery contacts and compartment are free of electrolytic contamination.

Any contamination of the battery contacts or compartment should be cleaned with a dry cloth.

Note: The CABPAT contains no user serviceable parts. If an **Error** warning should appear on the display please contact Emona Instruments Ltd for advice.

7 Battery Check

The CABPAT is powered from a 6 AA cells which are checked before a test is performed. When the battery voltage is low the  enunciator is illuminated. The unit will continue to perform within specification for a limited number of tests, dependent upon the type of the batteries fitted.

When the battery voltage reaches a level where the performance is affected the  enunciator will flash and all test keys are disabled. The batteries must be replaced.

7.1 Battery Replacement



Before opening the CABPAT ensure that all test leads are disconnected.

Switch off the unit by pressing and holding CL I and CL II buttons. Disconnect all leads from the CABPAT. Place the CABPAT face down and release the captive screw in the battery compartment cover. Remove the battery compartment cover and remove the discharged batteries.

Replacement batteries must be either Alkaline or NiMH.

Insert the replacement batteries into the battery compartment ensuring that the battery polarity matches the marking on the inside of the battery compartment.

Relocate the battery cover over the battery compartment and fasten in position with the battery cover captive screw.

8 Fuse

The unit is protected by a fuse. If the fuse should blow then the mains tests will not be allowed to start and the CABPAT will indicate that the mains connection is incorrect.

8.1 Fuse Replacement



Before opening the CABPAT ensure that all test leads are disconnected.

Switch off the unit by pressing and holding CL I and CL II buttons. Disconnect all leads from the CABPAT. Place the CABPAT face down and release the captive screw in the battery compartment cover. Remove the battery compartment cover and remove the fuse.

Ensure that the replacement fuse is a 20mm 10A 250V F Ceramic. Fitting the incorrect fuse type may lead hazard.

Insert the replacement fuse into the fuse holder. Relocate the battery cover over the battery compartment and fasten in position with the battery cover captive screw.

9 Service and Calibration

To maintain the specified accuracy of the measurement results, the instrument must be recalibrated at regular intervals by either the manufacturer, **Emona Instruments**. We recommend a recalibration period of one year.

For help or advice on Service and Calibration contact:

AUSTRALIA

Service Department:

Emona Instruments 78
Parramatta Rd
Camperdown NSW 2050

PO Box 15
Camperdown NSW 2050

Tel: (02) 9519 3933
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SA & TAS:
3/26 The Parade West, Kent Town SA 5067
Tel: 08 8363 5733

WA:
63 Shepparton Rd, Victoria Park WA 6100
Tel: 08 9361 4200

LOAD MESSAGES

Message	Reason	Solution
Lo Load	Appliance switch is not engaged (switch in off position)	Engage the switch (turn it on)
Lo Load	Appliance switch is engaged but requires power to latch	Insulation test ineffective. Consider doing a leakage test.
Hi Load	Appliance may draw more than 10 amps	Appliance under test is greater than 10A, consider doing Insulation test.






ERROR CODES

ERROR CODE	MEANING	ACTION
err 10	Internal relay failure	Return for Service.
err 12	No Insulation Volts	Return for Service.
err 61	Internal relay failure	Return for Service.
err 63	Internal relay failure	Return for Service.
err 80	Internal relay failure	Return for Service.

TEST SEQUENCE

TEST SETTING	DESCRIPTION	EARTH CONTINUITY	INSULATION TEST	LEAKAGE TEST	POLARITY TEST
CLI	Class I Earthed Appliance	±200mA	500V		
CLII	Class II Double Insulated Appalance		500V		
CLI- Lead Power Board	LEAD-IEC or Extension	±200mA	500V		Yes
CLI-Leakage	Class I Power-up Test	±200mA		240VAC	
CLII-Leakage	Class II Power-up Test			240VAC	

TEST SEQUENCE

TEST TYPE	PRESS BUTTON(S)	ATTACHMENT REQUIRED	EXAMPLES & COMMENTS
CLI		Appliance leads (black) connected to exposed mental parts.	3 pin - Most kitchen appliances (toaster, microwave..)
CLII		Appliance leads (black) connected to exposed mental parts.	Most hand held tools (2 or 3 pin socket)
Leads or Power Board Class I		IEC Leads Adaptor (red)	For power tools every socket must be checked.
Class I Leakage	 LKGE	Appliance lead (black) connected to exposed mental parts	Beware moving parts. Appliance is active.
Class II Leakage	 LKGE	Appliance leads (black) connected to exposed mental parts	Beware moving parts. Appliance is active.