

Seaward Europa Plus

Portable Appliance Checker

Instruction Manual

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Declaration of Conformity

for the

Seaward Europa Portable Appliance Checker

Manufactured by:

Seaward Electronic Ltd, Bracken Hill, South West Industrial Estate

Peterlee, County Durham, SR8 2SW, England

Millennium Statement

This product is Millennium compliant, and conforms fully to the document BSI DISC PD2000-1.

Statement of Conformity

Based on test results using appropriate standards, the product is in conformity with Electromagnetic Compatibility Directive 89/336/EEC and Low Voltage Directive 73/23/EEC


Standards used:

EN 61010-1 (1993) Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

EN 50081-1 (1992) Electromagnetic Compatibility. Generic Emission Standard: EN55022 Class B

EN 50082-1 (1992) Electromagnetic Compatibility. Generic Immunity Standard: IEC1000-4-2, -4-3, -4-4, -4-5

The tests have been performed in a typical configuration.

This Conformity is indicated by the symbol , i.e. "Conformité Européenne"

Before Starting

Upon receipt of your Europa PAC Plus Tester:-

1. Check that all the component parts are present:-
 - Seaward Europa PAC Plus Tester
 - Earth Continuity lead
 - 110v Adaptor
 - PATSLite Software disc
 - Computer Lead
 - Instruction Manual
 - Carrying Case
2. Read the operating instructions fully before conducting any tests.
3. Contact Seaward Electronic if you need information on training for Portable Appliance Testing. Courses can be arranged at Seaward, or at customer premises.
4. Seaward Electronic Limited can be contacted at:

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South West Industrial Estate
Peterlee
Co. Durham
SR8 2SW
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sales@seaward.co.uk

Safety

Note

Please read the following Safety Instructions before use !




Safety Precautions

The manual contains specific warning and caution statements where they apply.

A Warning will identify the conditions and actions that pose hazard(s) to the user.

A Caution will identify the conditions and actions that may damage the Tester.

Symbols used within this manual and on the Tester are shown below:

	Risk of electric shock
	Warning of potential hazard
	Conformité Européenne

Use of the instrument in a manner not specified may impair safety. Read the following safety information carefully before attempting to operate the instrument.



Due to the potential hazards associated with any electrical circuit it is important that the user is familiar with the instructions covering the capabilities and operation of this instrument. The user should ensure that all reasonable safety precautions are followed and if any doubt exists should seek advice before proceeding.

This product is designed for use by suitably trained competent personnel and should be operated strictly in accordance with the instructions supplied.

Failure to comply with these instructions may expose the user to electrical hazard

This Tester performs a number of electrical tests which involve high voltages and high currents. Never touch the appliance being tested, or the test leads, whilst a test is in progress.

Always check all test leads for signs of damage prior to use. Never use damaged or defective leads.

Always ensure the mains supply to the Tester provides an adequate earth.

This manual contains information and warnings which must be heeded to ensure user safety during operation. It is essential that this manual is read fully before proceeding with any tests.

Should the Tester behave abnormally do not continue with the testing. Disconnect immediately and contact Seaward Electronic for servicing (see Chapter 4 - Maintaining the Tester).

Chapter 1 Introducing the Tester

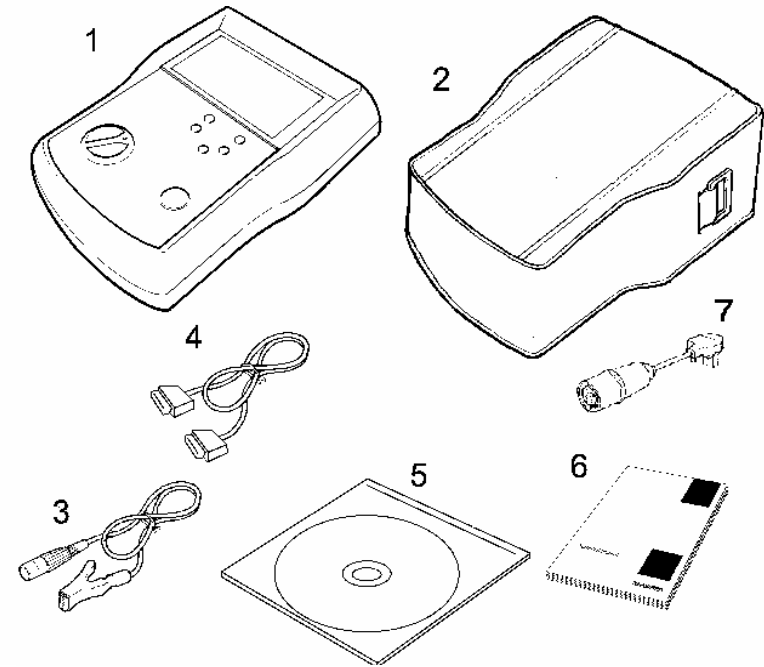
Introduction

The Seaward Europa Plus Portable Appliance Checker is a powerful tool to assist in the analysis of the safety of portable electrical and electronic equipment. A range of tests are provided, with innovative features to aid difficult test situations, which allow testing of a wide variety of equipment.

The Tester combines state of the art testability with the following innovative features:-

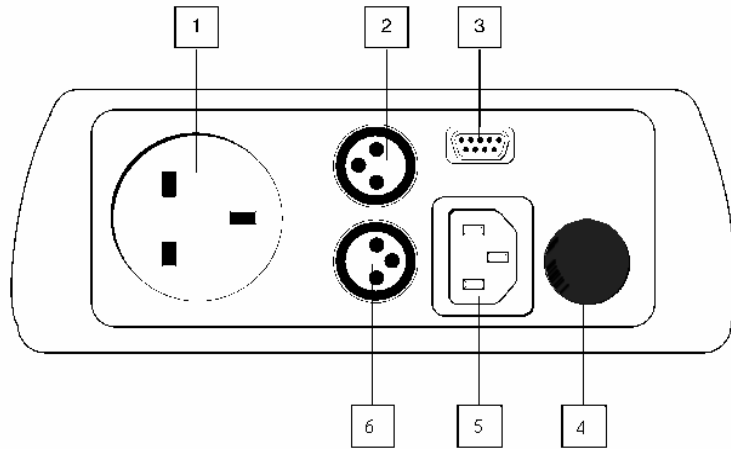
- Truly portable, multi-voltage tester
- Accurate earth continuity and leakage measurement even when multiple earth paths exist
- Tests Information Technology equipment
- Can measure Leakage through optional Clamp
- Stores up to 100 Test Results in memory
- Downloads to PATSLite and PATGuard Plus
- Connects to a printer to print results
- Fast Start-up
- Large, easy to read digital display
- Easy test selection

Your Portable Appliance Checker



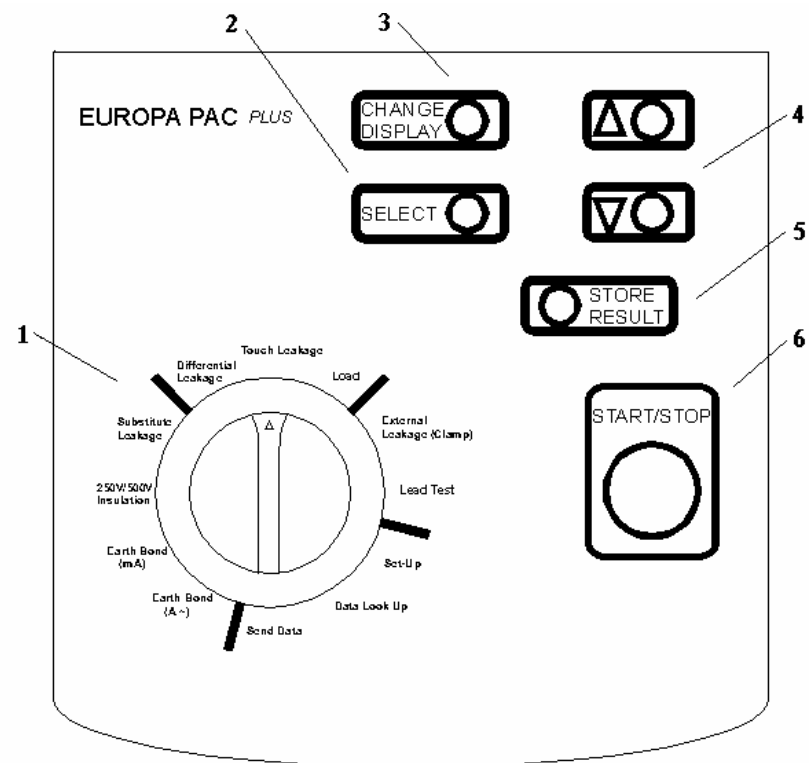
Item Number	Part
1	Europa Plus Portable Appliance Checker
2	Carrying case
3	Earth Continuity Lead
4	Computer Lead
5	PATSLite software disc
6	Instruction Manual
7	110v Adaptor

The Top Panel



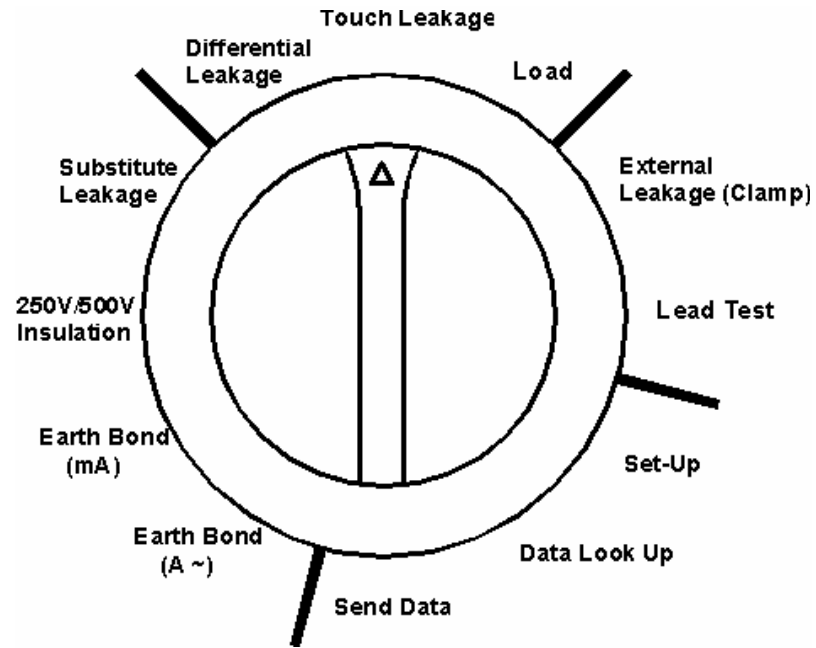
Item Number	Part
1	Mains socket
2	Main Earth Continuity/Insulation socket
3	RS232 Serial Interface
4	230V Mains Input
5	IEC Lead Socket
6	Auxiliary Earth Continuity socket, for point to point earth continuity measurement

The Keyboard



Item Number	Part
1	Rotary Switch
2	SELECT Button
3	CHANGE DISPLAY Button
4	Cursor Buttons
5	STORE RESULT Button
6	START / STOP Button

The Rotary Switch



Definitions

- Equipment Under Test (EUT) - The electrical / electronic apparatus which is the subject of testing.
- Powered Tests - The EUT is supplied with mains voltage, with measurements being taken of power consumption, leakage currents etc.
- Tester - The Seaward Europa Portable Appliance Checker
- Un-powered Tests - The EUT is the subject of electrical tests using stimuli generated within the Tester. The EUT is not provided with mains power.
- User - The test technician using the Tester to perform tests on an EUT

Chapter 2 Using the Tester

Introduction

Controls

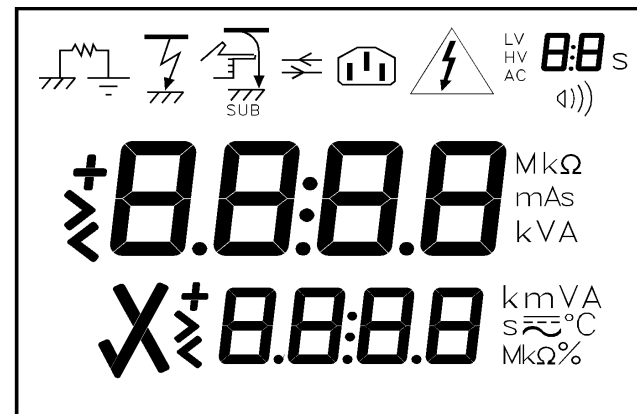
A rotary switch defines the basic test (or action) to be performed, the tests are arranged on the switch such that a clockwise rotation is needed to perform a normal sequence of tests.

Cursor buttons (\uparrow and \downarrow) allow for adjustment of test variables, e.g. test duration. The SELECT button is used to change the variable to be adjusted.

The large START/STOP button is used to start a Test.

Display

Test Icons



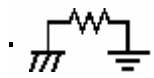
Primary Display

Secondary Display

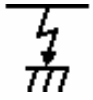
The display consists of a number of Icons to provide visual indication of the tester status, a primary 4 digit, 7 segment display, along with a 4 digit secondary display, and a 2 digit duration time display,

Test Icons

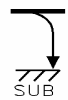
Indicates the test selected,



Earth Continuity



Insulation



Substitute Leakage



Differential Leakage
External Leakage



Touch Leakage



Load



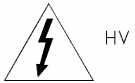
Lead Test

Test in Progress Icon

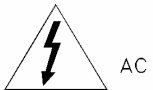
Indicates test in progress with voltage warning.

LV

Low Voltage



High Voltage



Applying Mains Power

Test Duration Counter

Indicates the timing of the test. This will count down, when the counter reaches zero if the Europa is still taking a measurement the counter will flash.

Primary Display

Indicates test result

Secondary Display

Before and during a test this display Indicates test output e.g. voltage or current specified. After a test, this display compares the test result with standard limits.

Connecting the Tester

The Tester must be powered by a 230V supply but can test both 230v and 110v appliances (see Testing 110v Appliances).

The supply to the tester must include an earth connection (e.g. via a 3 pin plug).

When switched on, the Tester will carry out a short self-test procedure (approximately 4 seconds). During this test, all display segments will be lit to allow verification of correct operation of the display

Once the start-up procedure of the Tester has been completed, the tester is ready for operation. The display will depend on the rotary knob position.

Set-Up Data

There are a number of settings that enable the user to set up the tester to perform in a particular manner. These are available by turning the rotary knob to the Set-Up Data position.

Beeper Setting

Different beep settings can be configured. With the primary display flashing the user can cycle through the current beep settings using the cursor buttons. Each option is described below.

ton1 – Beep at key press

ton2 – Beep at start of test and at end of test, if test Pass beep twice at end

ton3 – Beep when mains voltage applied to test socket

ton4 – Beep if test limit exceeded

To set the selected option to off or on press the SELECT button. Now the option's setting will flash, use the cursor buttons to chose the preferred setting, then press the STORE RESULT to go back to the options. At any time you can switch the rotary knob to a different selection and the current beep options will be active.

Substitute Leakage Setting

The Substitute Leakage can be set to display the reading for different set level increases in mains voltage. These are:

230v = 0%

244v = 6%

253v = 10%

With the primary display flashing cycle through the settings until SubS is displayed using the cursor buttons.

To set the selected option, press the SELECT button. Now the option's setting will flash, use the cursor buttons to chose the preferred setting, then press the STORE RESULT to go back to the options. At any time you can switch the rotary knob to a different selection and the current option will be active.

Leakage Test Setting

If a Leakage test exceeds the display range, the test can be stopped or allowed to carry on.

With the primary display flashing cycle through the settings until SET1 is displayed using the cursor buttons.

To set this option to off or on press the SELECT button. Now the option's setting will flash, use the cursor buttons to chose the preferred setting, then press the STORE RESULT to go back to the options. At any time you can switch the rotary knob to a different selection and the current options will be active.

Performing a Test

All tests are performed in a similar way - Rotate the switch to the appropriate test. For un-powered tests the test duration will be flashing in the top left corner. Use the cursor buttons to change the test time if required. Press the SELECT button to set other options for the test.

For most tests a test limit can also be set. Use the cursor buttons to select pre-defined limits or the user adjustable limit indicated by a plus (+) to the left of the limit. For details on test settings refer to the actual tests in this Instruction Manual.

When satisfied with the test conditions, press the START/STOP button to start the test

After a Test

After the Tester completes the selected test, the measured value continues to be displayed until a button is pressed, or a different test is selected. The Secondary display provides a comparison with standard test values.

Abort Actions

A test can aborted at any time by rotating the rotary switch. Note however that due to the functionality of the Load, Leakage and Touch Leakage tests the rotary knob must be rotated beyond these tests before they will be aborted.

Storing Test Results

The Europa PAC plus is able to store test results. To store results perform the required test and press STORE RESULTS.

Please note that timed tests can only be stored at the end of the test while tests which are continuous can be stored during and at the end of the result.

Set Date

As the date is required to be stored with each test result the first time you store a result the tester prompts you to enter the date.

The first time the STORE RESULT button is pressed after switch on after performing a test the user will be prompted to enter the date.

The primary display will flash dAt for approximately 2s then display the currently set day / month e.g. 12.07 for 12 July. The secondary display will show the currently set year. The leading day digit will be flashing, indicating that it can be changed. Use the cursor buttons to change the value. Press the SELECT button to allow the second day digit to be changed, indicated by the digit flashing. Use the cursor buttons to change its value. Press the SELECT button to allow the month to be changed. Proceed to change the month in the same way as the day. After the month is changed, the year can be changed in the same manner.

At any time (when the entire date is correct) pressing the STORE RESULT button will cause the tester to check the date is valid and if correct will store it to memory. Invalid dates will not be stored.

All subsequent result stores will not ask for the date until the tester is reset.

Press STORE RESULT to store the displayed date.

At any time during the date entry, pressing the CHANGE DISPLAY button or rotary switch action cancel any changes and leave the date unchanged in memory.

Appliance Number and Storing Results

After the date has been stored or has been set on a previous store, pressing the STORE RESULTS button will cause the primary display to flash STOR for about 2s then both primary and secondary displays will display four digits each (eight total) with the lead digit flashing. Use the cursor buttons to change the value of the digit. Pressing the SELECT button will cause the next digit in turn to flash indicating that its value can be changed using the cursor buttons. Use the SELECT button to select each digit in turn changing the value if appropriate with the cursor buttons until the correct appliance number is displayed.

Press the STORE RESULT button to store the displayed appliance number. The tester will display STOR on the primary display with the secondary display alternating between '----' and a memory location for approximately 2s. Confirmation that the result has been stored is signaled by two short beeps.

If the memory is full when attempting to store a result the primary display will show STOR with the secondary display flashing Full.

Memory Options

There are three options available:

- Recall result
- Delete last result
- Delete all data
- Memory available

Move the rotary switch to Data Look Up, use the cursor buttons to select a memory option.

Recall Result

Use the cursor buttons to select rCL. Press the SELECT button to select this option. The two digits in the top right hand corner indicate appliance location. The primary display shows the measured value. The secondary display shows the test limit. The type of test is indicated by the test icon.

The cursor buttons are use to move through the memory locations. On initial entry into recall result the last saved memory location is displayed.

If an attempt is made to recall a result outside of the saved memory range a message is displayed. Attempting to recall below the first saved result will cause bot to be displayed. Attempting to recall above the last saved result will cause the toP to be displayed.

Delete Last Result

Use the cursor buttons to select CLr. Press the SELECT button to select this option. The two digits in the top right hand corner indicate memory location. The primary display shows the measured value. The secondary display shows the test limit. The type of test is indicated by the test icon. Only the last result in memory can be deleted.

To delete the result press the START / STOP button. While erasing the result secondary display will flash '----'. After deleting the result the memory location number will be decremented by one.

Delete All Data

Use the cursor buttons to select Clr on the primary display with ALL on the secondary display. Press the SELECT button to select this option.

Press the START / STOP button to delete all data. Both primary and secondary displays will flash, awaiting confirmation. To confirm that you wish to delete all data press the START / STOP button again.

Memory Available

Use the cursor buttons to select STOR. Press the SELECT button to select this option.

The two digits in the top right hand corner indicate memory location last used. The secondary display indicates the percentage of free memory available.

Send Data

To print the test results stored in memory or to download them to an appropriate PC program, select Send Data with the rotary switch.

Note

Only the PATSLite program (supplied with the tester) and the PATGuard Plus program are capable of processing test results from the Europa PAC Plus.

The primary display will alternate between Send and PrSt indicating press START / STOP button to commence sending data. With the printer connected and on-line or with the program awaiting test results, press the START / STOP button.

While sending data the primary display will show Send with the secondary display showing '----'. When complete the primary display will show End.

Note

All of the current contents of memory are sent. It is not possible to be selective.

Download Data Format

The data format will be as follows for Appliance Tests:

TEST NUMBER	002
DATE	18/05/02
APP NO	12345678
EARTH (10A)	0.01Ohm P
INS (250V)	8.00MOhm P
SUB LKGE	0.24mA P
DIFF LKGE	0.30mA P
TOUCH LKGE	0.30mA P
EXT LKGE	0.28mA P
LOAD	3.68kVA
VOLTS	230V
CURRENT	5.65A

The data format will be as follows for Lead Tests:

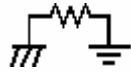
TEST NUMBER	001
DATE	19/05/02
APP NO	12345679
EARTH (100mA)	0.03Ohm P
INS (500V)	>99.99MOhm P
POLARITY	PASSED

The last test block is indicated by:

END OF DATA

AC Earth Continuity Tests

Switch Position ----- **Earth Continuity A~**



Test Icon Displayed ---

Class 1 (earthed) appliances

Plug the EUT into the tester outlet socket, connect the Earth Continuity lead from its socket to the appliance metal part.

Class 2 (unearthed) appliances

This test cannot be performed since no earth connection is present in the appliance plug.

Test Description

This test is to ensure that the connection between the earth pin in the mains plug of the appliance and the metal casing of the appliance is satisfactory and of sufficiently low resistance.

The 10A test current is applied between the earth pin of the mains supply plug and the earth continuity test lead clip.

A high current is normally used to stress the connection under fault conditions. The length of the test should be limited to prevent damage due to overheating.

User Selectable Settings

Each press of the SELECT button will allow you to cycle through the user selectable settings; test duration and test limit. The currently selected setting will be flashing.

Test Duration

With the test duration flashing, use the cursor keys to step through the test duration settings. A test duration can be set from 2s to 10s in 1s steps.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Test Limit

With the secondary display flashing and indicating resistance (Ω displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

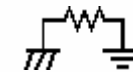
A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

DC Earth Continuity Tests

Switch Position -----**Earth Continuity** $\frac{mA}{---$



Test Icon Displayed ---

Class 1 (earthed) appliances

Plug the EUT into the tester outlet socket, connect the Earth Continuity lead from its socket to the appliance metal part.

Class 2 (unearthed) appliances

This test cannot be performed since no earth connection is present in the appliance plug.

Test Description

This test is to ensure that the connection between the earth pin in the mains plug of the appliance and the metal casing of the appliance is satisfactory and of sufficiently low resistance.

The test current is applied between the earth pin of the mains supply plug and the earth continuity test lead clip.

User Selectable Settings

Each press of the SELECT button will allow you to cycle through the user selectable settings; test duration and test limit. The currently selected setting will be flashing.

Test Duration

With the test duration flashing, use the cursor keys to step through the test duration settings. A test duration can be set from 2s to 60s in 1s steps or a continuous measurement indicated by two dashes (--).

When a fixed test duration is set, the time will be divided into two equal periods. During the first period a test current of +200mA will be applied. During the second period a test current of -200mA will be applied.

If a continuous test duration is set then, the first press of the START/STOP button will generate a +200mA test current continuously. Pressing the START/STOP button again will stop the test. Pressing the START/STOP button a third time will generate a -200mA test current.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Test Limit

With the secondary display flashing and indicating resistance (Ω displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Insulation Tests

Switch Positions ----- **250V / 500V**
Insulation

Test Icon Displayed ---



Warning

250 or 500V d.c. test



voltage

Class 1 (earthed) appliances

Plug the EUT into the tester outlet socket

Class 2 (unearthed) appliances

Plug the EUT into the tester outlet socket, connect the Earth Continuity lead from the Main socket to the appliance metal part.

Test Description

This test is used to verify that adequate insulation exists between the mains supply pins and earth.

During the insulation test, a 250V or 500V DC voltage is applied between the earth pin and both the live and neutral pins of the appliance mains supply plug. The Tester displays the resistance measured and allows the user to confirm sufficient insulation exists.

For Class 2 appliances, the Earth Continuity Test is used for an earth return lead.

For appliances which incorporate over-voltage protection, and hence produce a false failure condition when 500v insulation tests are used, a 250V test voltage is provided to allow a reading to be taken without the protection devices generating a false failure.

User Selectable Settings

Each press of the SELECT button will allow you to cycle through the user selectable settings; test duration, test voltage and test limit. The currently selected setting will be flashing.

Test Duration

With the test duration flashing, use the cursor keys to step through the test duration settings. A test duration can be set from 2s to 60s in 1s steps or a continuous measurement indicated by two dashes (--).

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Test Voltage

With the secondary display flashing and indicating voltage (v displayed), use the cursor keys to step through the test voltage options. A 250V or 500V test voltage can be set.

Test Limit

With the secondary display flashing and indicating resistance (M Ω displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

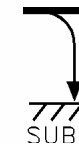
Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Substitute Leakage Test

Switch Position -----

Substitute Leakage

Test Icon Displayed ---



Class 1 (earthed) appliances

Plug the EUT into the tester outlet socket.

Class 2 (unearthed) appliances

Plug the EUT into tester outlet socket, connect the Earth Continuity lead from its socket to the appliance metal part.

Test Description

The substitute leakage test applies a nominal voltage of 40V AC RMS to the appliance and is applied between the earth pin and both the live and neutral pins of the supply plug. For Class II appliances, connect the Earth Continuity test clip to the appliance as a substitute for the Earth.

Substitute Leakage Test

The Tester measures the current that flows and scales the result to display a guide to the current that would flow if the test voltage had been the nominal mains supply voltage.

Please note that values for Substitute Leakage may differ substantially from that of conventional Earth Leakage tests because of the way that the test is performed (e.g. it will be affected by the presence of Neutral-to-Earth suppression devices).

This test can prove useful in situations where conventional Insulation tests are unacceptable.

User Selectable Settings

Each press of the SELECT button will allow you to cycle through the user selectable settings; test duration and test limit. The currently selected setting will be flashing.

Test Duration

With the test duration flashing, use the cursor keys to step through the test duration settings. A test duration can be set from 2s to 60s in 1s steps or a continuous measurement indicated by two dashes (--).

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Test Limit

With the secondary display flashing and indicating current (mA displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the

next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Powered Tests



Warning

Mains voltage applied to appliance

The following powered tests differ from the previous tests in that they apply mains supply voltage to the appliance to perform their functions:-

- Differential Leakage
- Touch Leakage
- Load

Note

These tests are not available when using the 110v adaptor.

The Tester performs an initial low voltage test to establish that the appliance can be safely powered.

When the rotary switch is rotated through the different power tests the power supply is not interrupted but the test counter is reset. This allows the user to obtain results from all three tests without having to interrupt the power. To abort a power test rotate the knob beyond the power tests.



Warning

It is important that the user verifies that an appliance with moving parts (e.g. an electric drill) is safely mounted to allow movement without causing damage to equipment or personnel.

Differential Leakage Test

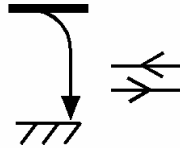
If the potential load current is too high, a warning message appears, allowing the user to continue. This message will be displayed if a Live to Neutral short exists, and if tests are continued the tester's fuses will blow.

If the potential load current is low, a warning message appears to allow the user to check that the appliance is switched on, and all fuses are intact.

The Tester also performs an internal safety test to verify that internal relays are properly set before applying full mains supply to the appliance.

Differential Leakage Test

Switch Position ----- **Differential Leakage**



Test Icon Displayed ---



Warning

Mains voltage applied to appliance

All Appliances

Plug EUT into tester outlet socket

Test Description

The Differential Leakage Test shows the current being lost through Leakage as the difference in the currents flowing in the Live and the Neutral conductors. This difference is the total leakage current from the appliance, and is generally equivalent to the current flow through the earth lead of the appliance. The test result is displayed in milliamperes (mA).

This differential method of determining leakage will show the full leakage of an appliance in-situ, so if the appliance has an extra earth point, e.g. a water pipe, then the Tester will show the full and true appliance leakage current.

Test Duration

The test is continuous and is stopped by either pressing the START/STOP button or by switching to an un-powered test. In both cases the test will be stopped and the power to the appliance removed. Switching to another powered test will stop the previous test and start the new test without interrupting power to the appliance.

User Selectable Settings

Only the test limit can be set by the user for this test.

Test Limit

With the secondary display flashing and indicating current (mA displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

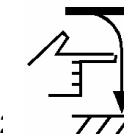
Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Touch Leakage Test

Switch Position -----

Touch Leakage

Test Icon Displayed ---





Mains voltage applied to appliance

All Appliances

Plug EUT into tester outlet socket, use Earth Continuity lead from Main socket to appliance metal part.

Test Description

The Touch Leakage Test displays the leakage current that would flow if the appliance was touched by a person. The Tester detects any current flowing in the Earth Continuity Lead (attached to an appropriate point on the appliance) and indicates the potential leakage through a metal panel. The Tester displays the result in milliamps (mA).

Test Duration

The test is continuous and is stopped by either pressing the START/STOP button or by switching to an un-powered test. In both cases the test will be stopped and the power to the appliance removed. Switching to another powered test will stop the previous test and start the new test without interrupting power to the appliance.

User Selectable Settings

Only the test limit can be set by the user for this test.

Test Limit

With the secondary display flashing and indicating current (mA displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Load Test

Switch Position ----- **Load**

Test Icon Displayed --- 

 **Warning**
Mains voltage applied to appliance

All Appliances

Plug the EUT into the tester outlet socket.

Test Description

The Load test supplies the equipment under test (the appliance), connected to 230V test socket, with the rated voltage of that socket.

The tester displays the mains voltage (V) applied to the Appliance on the secondary display. The current (A) drawn by the Appliance during the test is displayed on the primary display. Pressing the CHANGE DISPLAY button will cause the primary display to show power consumption in KVA. Repeated pressing of the CHANGE DISPLAY button will cycle the primary display between power and current.

Test Duration

The test is continuous and is stopped by either pressing the START/STOP button or by switching to an un-powered test. In both cases the test will be stopped and the power to the appliance removed. Switching to another powered test will stop the previous test and start the new test without interrupting power to the appliance.

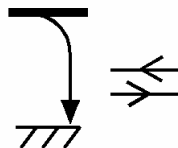
User Selectable Settings

There are no user selectable settings.

External Leakage Test

Switch Position -----**External Leakage (Clamp)**

Test Icon Displayed ---



Warning

Mains voltage applied to appliance

Note

This test requires the use of a current clamp, which is an optional accessory (see Chapter 5 Accessories).

All Appliances

Plug the current clamp into the appropriate socket. Open the clamp jaws and clamp around the cable you wish to measure current flow through. Power is applied to the EUT at the mains socket.

Test Description

The tester will display the current detected by the external clamp. If this is around a protective conductor, earth leakage will be displayed. If the clamp is around the phase and neutral conductors then

differential leakage will be displayed. DO NOT connect the clamp around only the phase or neutral conductors.

Test Duration

The test is continuous and is stopped by either pressing the START/STOP button or by switching to another test. In both cases the test will be stopped.

User Selectable Settings

Only the test limit can be set by the user for this test.

Test Limit

With the secondary display flashing and indicating current (mA displayed), use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

IEC Lead Test

Switch Position ----- **Lead Test**

Test Icon Displayed ---



For IEC Leads

Plug the lead into the tester outlet socket and plug the IEC end into the tester's IEC socket.

For Extension Leads

Plug the lead into the tester outlet socket and use a short IEC lead to connect from the tester's IEC socket to the extension lead outlet socket.

Test Description

The IEC test performs in sequence an earth continuity, insulation and polarity check on the Live and Neutral conductors and confirms that there are no breaks or cross wiring in these conductors.

User Selectable Settings

Each press of the SELECT button will allow you to switch between user selectable test limit for Earth Continuity and Insulation. The currently selected setting for the selected test will be flashing.

Note

To determine which test limit is currently displayed, observe the unit of measurement symbol. For Earth Continuity Ω is displayed. For Insulation $M\Omega$ is displayed.

Test Limits

With the secondary display flashing use the cursor keys to step through the test limits available and stop with the appropriate limit displayed.

A special limit indicated by a plus sign (+) to the left of the limit, is a user adjustable limit.

Press SELECT to swap between the Earth Bond and Insulation pass/fail limits.

To set your own limit, with this user adjustable limit flashing press both cursor keys together. The limit as a whole will stop flashing with the most significant digit flashing. Use the cursor buttons to set a value for the flashing digit. Press the SELECT button to enable the next digit in turn to flash. Use the cursor buttons to set a value for this flashing digit. Then press the SELECT button to move to the next digit. Repeat these actions until all digits are set to your chosen value. Press the STORE RESULT button to set the limit.

Press the SELECT button to change to another setting or press the START/STOP button to perform the test if the other settings are acceptable.

Test Sequence

The first test is an Earth Continuity test at 200mA. This is indicated by the secondary display showing PE Ω .

The test is divided into two 2s tests. During the first period a test current of +200mA will be applied. During the second period a test current of -200mA will be applied.

The second test is an Insulation test at 500v d.c. This is indicated by the secondary display showing LnPE M Ω .

The third test checks the lead wiring is correct. This test checks for open circuit or shorted wires as well as crossed polarity between Phase and Neutral. The result of this test is displayed as a Pass or Fail.

By pressing the CHANGE DISPLAY button at the end of the test and using the cursor buttons it is possible to cycle through the test results for the Lead Test.

Testing 110v Appliances

The 110v adaptor lead is used to connect 110v appliances to the tester's outlet socket. Only Earth Continuity, Insulation and Substitute Leakage measurements can be made.

The adaptor lead is wired to prevent power tests being performed, since this would supply full mains voltage (230v) to the EUT.

Chapter 3 Tips & Troubleshooting

Tester Self Tests:

When the tester is powered on and prior to certain tests, a number of messages can appear as the tester performs safety tests on itself and the mains power supply. If a fault is identified, Err appears on the primary display and the error number is shown on the secondary display. If any of the self tests fail, then one of the following displays will be seen.

Err 01 with flashing cross

No Earth to tester

Have the mains power socket that is supplying power to the tester checked. If the power socket checks out Ok then the tester may have an internal fault and should be returned to your Service Agent

Err 02 with flashing cross

Incoming mains Live voltage on Neutral.

Have the mains power socket that is supplying power to the tester checked. If the power socket checks out Ok then the tester may have an internal fault and should be returned to your Service Agent

Err 03 with flashing cross

Internal relay fault

Return to your Service Agent if problem persists.

Err 04 with flashing cross

Internal relay fault

Return to your Service Agent if problem persists.

Err 05 with flashing cross

Internal relay fault

Return to your Service Agent if problem persists.

Err 06 with flashing cross

Internal relay fault

Return to your Service Agent if problem persists.

Err 07 with flashing cross

Memory corruption.

Return to your Service Agent.

Powered Tests

The Tester performs a number of checks prior to and during powered tests. The following primary display messages can occur.

Lo Po

Low power caused by load less than 60w. The user can override this message if low load is expected by pressing the START/STOP button.

Hi Cu

High current is expected to be drawn by the EUT. This message appears if the current is greater than 16A. The user can override this message, provided the current is not expected to exceed 50A, if it is caused by a high start up current by pressing the START/STOP button.

Temperature monitoring

The tester is provided with internal temperature monitors to ensure sensitive components are not overheated. High rates of testing may cause this situation, especially with long Earth Continuity tests. Setting Earth Continuity test times to 2 secs will increase operating time. If the message Hot appears on the primary display, leave the tester to cool down. Once the temperature is below the trip level the display will revert to normal for the rotary switch position selected.

Multiple Earth connections:

In general, multiple earth connections to an EUT (e.g. water pipe connections to a water heater) can cause difficulties in measurement. This has previously needed the additional earth connections to be isolated.

The Europa PAC Plus tester is capable of testing earth connections in the presence of additional earth paths. The Leakage measurement will also be correct due to the differential leakage current, rather than the earth lead current. Measurements are thus assured without special precautions.

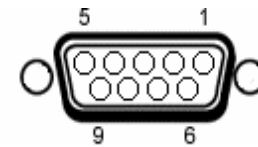
Interfacing

The Tester provides a single 9 way connector for a serial interface to a printer:-

The Connector pin outs for Serial port are shown below:-

Serial Port

The serial port uses a standard 9-way D-type connector



Pin	Description
1.	N.C.
2.	RX
3.	TX
4.	DTR
5.	0V
6.	N.C.
7.	0V
8.	N.C.
9.	+5V

Baud Rate: 9600
 Start Bits: 2
 Data Bits: 8
 Stop Bits: 1
 Parity: None

Chapter 4 Maintaining the Tester

Cleaning the Tester

The Tester case can be cleaned with a damp cloth, with if necessary, a small amount of mild detergent. Prevent excessive moisture around the socket panel or in the lead storage area.

Do not allow liquid inside the Tester, or near the sockets. Do not use abrasives, solvents, or alcohol.

If any liquid is spilt into the Tester case, the Tester should be returned for repair, stating the cause of the defect.

User Maintenance

The Tester is a rugged quality instrument. However, care should always be taken when using, transporting and storing this type of equipment. Failure to treat the product with care will reduce both the life of the instrument and its reliability.

If the Tester is subject to condensation, allow the Tester to completely dry before use.

- Always check the Tester and all test leads for signs of damage and wear before use.
- Do not open the Tester under any circumstances.
- Keep the instrument clean and dry.
- Avoid testing in conditions of high electrostatic or electromagnetic fields.
- Maintenance should only be performed by authorised personnel.
- There are no user replaceable parts in the Tester.
- The unit should be regularly calibrated (at least annually).
- For repair or calibration return the instrument to:-

Seaward Electronic Limited.
Bracken Hill
South West Industrial Estate
Peterlee
Co. Durham
SR8 2SW
Tel : +44 (0)191 586 3511
Fax: +44 (0)191 586 0227
sales@seaward.co.uk

Chapter 5 Accessories

A series of standard and optional accessories are available for the Seaward Europa PAC Plus Tester. The standard accessories are supplied with the Tester.

Standard Accessories

Accessory	Part Number
Earth Continuity Test Lead	249A908
PATSLite software disc	303A912
Computer Lead	194A919
230V / 115V Adaptor	270A076
Carry Case	270A950
Instruction Manual	293A552

Optional Accessories

Accessory	Part Number
Calibration Checkbox	283A951
Thermal Printer	283A954
Thermal Paper Rolls (5)	283A964
Serial Printer Lead	283A955
PATGuard Plus software	296A910
Pass Labels (500)	91B038

Chapter 6 Specifications

AC Earth Continuity Test

Test Voltage *6V rms nominal (no load)
Test Current * 10A (into s/c load)
Range 0m Ω - 19.99 Ω
Resolution0.01 Ω
Accuracy..... +/- 5% of reading, +/- 2 digits (0.05 - 5.00 ohms)
Pass Levels 0.1 Ω , User defined
Misc..... .4-wire measurement, floating earth

DC Earth Continuity Test

Test Voltage *4V dc nominal (no load)
Test Current * +200mA, -200mA (into s/c load)
Range00m Ω - 19.99 Ω
Resolution0.01 Ω
Accuracy..... +/- 5% of reading, +/- 2 digits (0.05 - 5.00 ohms)
Pass Levels0.1 Ω , User defined
Misc4-wire measurement, floating earth

Insulation Test

Test Voltage * 500V d.c. or 250V d.c. nominal (0.5M Ω load)
Short Circuit Current 2mA d.c. maximum
Range..... 00k Ω - 100 M Ω
Resolution 0.01 M Ω (<100 M Ω)
Accuracy..... +/- 5% of reading, +/- 2 digits (100k Ω - 5M Ω)
Pass Levels..... 0.25M Ω , 0.50M Ω , 1.0M Ω , 2.0M Ω , User defined

Substitute Leakage Test

Test Voltage * 40V a.c. o/c
Display Range 0.2 - 20.0 mA a.c.
Resolution 0.01mA
Accuracy +/- 10% of reading, +/- 2 digits (1.00 - 20mA)
Pass Levels 0.25mA, 0.5mA, 3.5mA, 7mA, 15mA, User defined

Differential Leakage

Range 0.0mA - 10.0mA
Resolution 0.01mA
Accuracy +/- 5% of reading, +/- 4 digits (0.2 – 20mA)
Pass Levels 0.25mA, 0.25mA, 0.75mA, 3.5mA, User defined

Touch Leakage

Range 0.0mA – 3.5mA
Resolution 0.01mA
Accuracy +/- 5% of reading, +/- 4 digits (0.1 – 3.5mA)
Pass Levels 0.25mA, 0.75mA, 3.5mA, User defined

Load Test

Socket 230V BS 1363
Measured Voltage 195 - 300V (Indication only)
Measured Current 0.50 – 16A (Indication only)
Measured Load 0 - 4kVA (Indication only)

External Leakage

Range 0.0mA – 19.99mA
Resolution 0.01mA

Accuracy..... Indication only
Pass Levels User defined

Lead Test

Earth Continuity

Test Voltage *4V dc nominal (no load)
Test Current *+200mA, -200mA (into s/c load)
Range 00m Ω - 19.99 Ω
Resolution0.01 Ω
Accuracy.....+/- 5% of reading, +/- 2 digits (0.05 - 5.00 ohms)
Pass Levels0.1 Ω , User defined

Insulation

Test Voltage * 500V d.c. or 250V d.c. nominal (0.5M Ω load)
Short Circuit Current 2mA d.c. maximum
Range 00k Ω - 100 M Ω
Resolution0.01 M Ω (<100 M Ω)
Accuracy..... +/- 5% of reading, +/- 2 digits (100k Ω - 5M Ω)
Pass Levels..... 0.25M Ω , 0.50M Ω , 1.0M Ω , 2.0M Ω , User defined

Power Conductor Continuity

Test 40V d.c
Detects..... PASS, FAIL indication

* - Test stimulus based on mains supply of 230V, varies with supply voltage.

Mechanical

Size..... 450mm x 410mm x 155mm

Weight..... 3.5kg

Environmental

Operating 0°C to 40°C (non condensing)

Storage -10°C to 50°C (non condensing)

Maximum R.H90%

Supply Rating..... 230V +/- 10%, 50/60Hz

Max Output Current16A

Appendix

Test Limits

The following test values are recommended by the Institute of Electrical Engineers as suitable limits for in-service testing in most applications. Note that these are for guidance only, test engineers must use their knowledge and common sense in each practical application.

Earth Continuity Limit

The IEE 'Code of Practice for In –Service Inspection and Testing of Electrical Equipment' defines the pass limit for earth continuity as:

$$< 0.1 + R^*$$

* where R is the resistance of the protective conductor of the supply cord –cables of 2 metre or less should be less than 0.1Ω

Note that actual readings depend on good connection to the Earth Continuity Clip and to the Earth Pin.

Insulation Resistance Limits

Appliance Class	Insulation Resistance
Class I heating equipment with a rating \geq 3 kW	0.3MΩ
All other Class I equipment	1.0MΩ
Class II equipment	2.0MΩ
Class III equipment	0.25MΩ

Protective Conductor / Touch Current Limits

Appliance Class	Maximum Current
Portable or hand held Class I equipment	0.75mA
Class I heating appliances	0.75mA or 0.75mA per kW, whichever is the greater with a maximum of 5mA
Other Class I equipment	3.5mA
Class II equipment	0.25mA
Class III equipment	0.5mA

Copies of the IEE 'Code of Practice for In-Service Inspection and Testing of Electrical Equipment' may be obtained from:

The Institution of Electrical Engineers
P.O. Box 96
Stevenage,
Herts SG1 2SD
ISBN 0 85296 776 4