IT4900
PORTABLE APPLIANCE TESTER

Operating Instructions

Di-loG®

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1. SAFETY

Read instructions before use.

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

The IT4900 performs a number of electrical tests which involve high voltages and high currents. Never touch the appliance being tested while the testing procedure is being followed.

This product is designed for use by suitably trained competent personnel.

Getting Started

On receiving your tester:-

1. Read Instructions
2. Plug in tester and leave for 18 hours to charge battery back up
3. Clear Memory

2. INTRODUCTION AND DESCRIPTION

The IT4900 is one of the most advanced portable appliance testers (PATS) available, performing five functions and providing a comprehensive guide to the electrical safety of both Class 1 and Class 2 electrical appliances.

The instrument is micro processor controlled and enables the user to select either test code automatic or manual mode which gives control of the testing sequence to the instrument's computer or operator. Alternatively, the IT4900 can be controlled by a remote IBM compatible PC.

The equipment performs the test selected by the user and records the results in its internal memory which is capable of storing up to 500 sets of test results.

To speed up data entry the Test Item Number, Test Code Number and the User Code can all be entered by a bar wand recorder.

In addition to test results the memory also records the appliance number, the user code and the date of testing. Preset pass/fail limits have been programmed into the IT4900 and the test result is clearly displayed on the instrument's LCD and any hard copy print out.

The fully charged battery backed memory will store test results for up to six months without being reconnected to the supply for re-charging, however it is recommended that the contents of the memory are printed or downloaded to a PC daily.

Particular features of the specifications are;

Multiple test facility
Allows repetition of earth bond and insulation tests in manual and test code modes.

Repeat test facility
Allows for batch or production testing.

Alpha-numeric facility
Allows the appliance number and user code to be a mixture of alpha-numeric characters.

Bar code reader input Remote Control facility
Allows the IT4900 to be controlled by a remote PC via the serial port.

3. LAYOUT OF IT4900

The IT4900 is contained in a robust ABS/Polycarbonate injection moulded case which accommodates all the high voltage and power components in the base section and the micro computer and electronic control in the lid/display.

A sturdy zip pouch located at the rear of the instrument enclosure contains all necessary test leads and the mains supply connector. Access is also available to the replaceable protective fuses through this zipped compartment where applicable. Earth bond sockets also located in this pouch.

The base control panel of the instrument features a sixteen keypad for control of the test sequence and for the input of data into the instrument's memory. On the right hand section is the mains socket outlet for connection to the test apparatus, an IEC connector for testing of IEC leads, two sockets for the earth bond and a socket for the insulation probe. A second set of earth bonds sockets on the near panel can allow point to point measurements of resistances.

The standard IT4900 performs five functions: and can be set to test appliances or IEC leads.

1. Visual Inspection
2. Earth Bond
3. Insulation
4. Earth Leakage Test
5. IEC Lead Continuity/Polarity Test

The control and use of the instrument is extremely simple with clear explicit prompts on the large LCD.

A number of safety features are included in the instrument design and these include:

1. Fuse protection.

2. The unit has a preset Pass/Fail level for each test. In addition a preset trip level has also be incorporated for each test which will terminate the test if the measured level exceeds this value. The exact trip level will vary according to test but will normally be approximately 120% of the Pass/Fail level.

3. An electronic cutout which provides rapid disconnection of internal relays where test results are detected which are in excess of 5 times the fail limit.

Use of the IT4900 is straight forward and involves connecting the tester to a suitable mains supply, the electronic circuit is powered from the supply. Plug the appliance under test into the instrument socket outlet and connect the test leads appropriate to the insulation Class of the appliance.

The user is then guided through the testing procedure by the instructions on the LCD panel.

4. APPLICATIONS

The IT4900 is designed to check the electrical safety of portable appliances and its comprehensive testing routine allows for appliances of Safety Class 1 and Class 2 insulation to be checked.

As a guide BS and IEC standards define these two categories of insulation as follows:

Class 1 Appliances which have a functional insulation throughout and an earth connected case. These are often described as earthed appliances.

Class 2 Appliances which have both functional and additional insulation and where any metal parts cannot become "Live" under faulty conditions.

The symbol represents double insulation and no earth connection is present in this type of appliance.

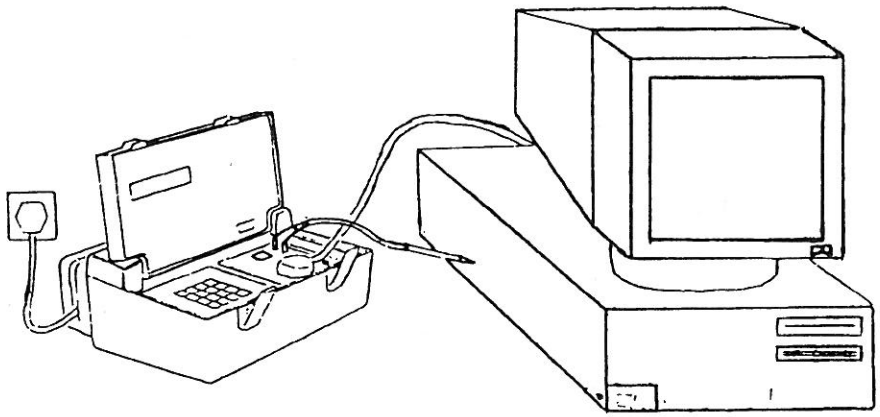
Different regulations and standards describe a variety of tests for electrical appliances and in general cover type approval tests. Such testing involves prolonged sophisticated techniques. It is generally recognised that for periodic inspection to ensure that the safety of the appliance is maintained tests of the type performed by the IT4900 are realistic and satisfactory.

Before commencing testing, the IT4900 will remind the user that he has the option to do visual checks on the mains lead, case and fuse of the appliance. Five different tests are performed by the IT4900 and these are described as follows:

Earth Bond Test

The objective of this test is to ensure that the connection between the earth or protective conductor of the appliance's mains supply plug earth pin and the metal casing of the appliance is satisfactory and of a low enough value to satisfy accepted safety standards.

The IT4900 applies a low voltage of approximately 6 volts AC RMS between the earth pin of the mains supply plug and the lead connected to the earth bond test terminal, a current is allowed to flow for a period of 5 seconds which can be selectable at 0.1, 4, 6, 12, 20 or 25 Amps. The duration of the test is limited to 5 seconds to prevent damage or over stressing which may be caused by testing for prolonged periods.



TEST 1 - Earth Bond Test/0.1 - 25 Amps

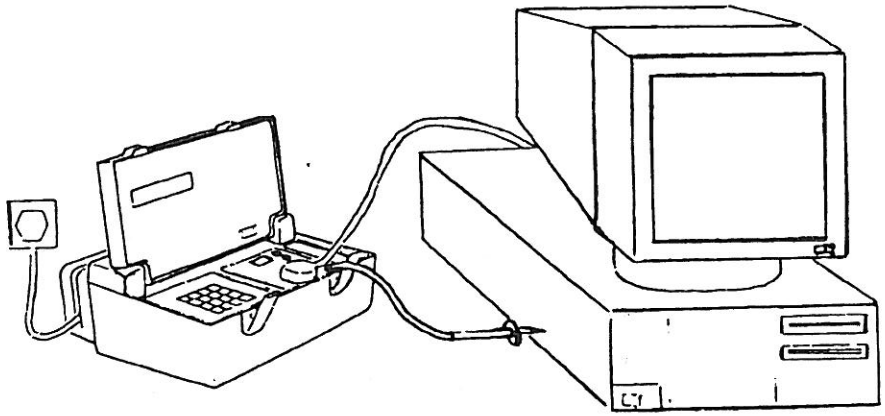
Insulation Test

The Insulation test applies a nominal 500 volts DC between the earth pin of the portable appliances mains supply plug and the phase (also known as "live") and neutral pin which are connected together for the duration of the test.

The IT4900 displays the resistance and enables the user to confirm sufficient insulation levels exists.

For Class 2 appliances, insulation can be considered to be connected to earth for the purpose of this test.

Note: Default pass level: 2 Mohm Class 1
7 Mohm Class 2



TEST 2 - Insulation Test/500V DC
(Probe not needed for earthed appliances ie. Class 1)

Leakage Test

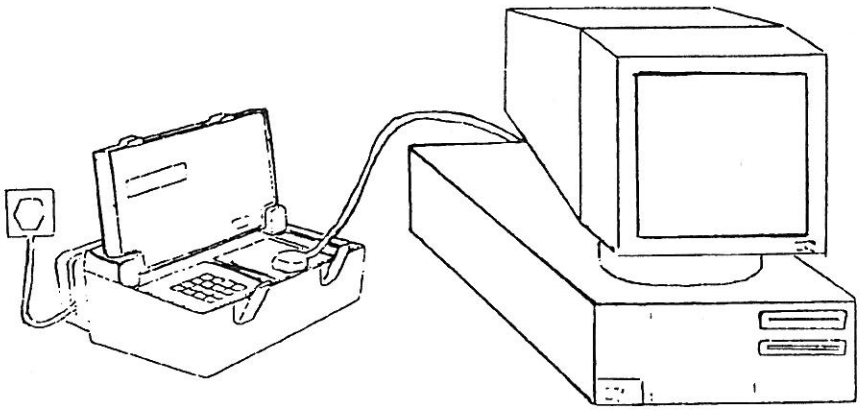
The test item is energised at normal working voltage through the mains supply plug. The IT4900 monitors the current flow through the earth lead of the appliance and displays the result on the screen with a pass or fail indication.

Note: Default pass level 3.5 mA class 1
0.75 mA class 2

This particular test is of value when an appliance incorporates a number of sequences which may change the electrical characteristics of the product during its operation. These defects would not be apparent under normal passive testing.

Note: It is important for complete testing that the appliance is switched on for the duration of the test cycle.

⚠ **Warning:** Ensure that no hazard will occur when the appliance operates.



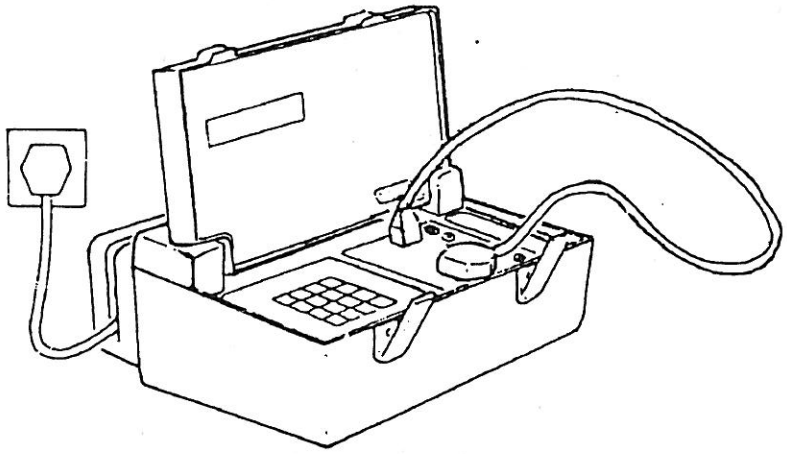
TEST 3 - Earth Leakage Test

Note: Switch appliance on. Press # to apply power to appliance.

IEC Lead Continuity/Polarity Test

The objective of this test is to ensure continuity and correct polarity of live and neutral conductors in an IEC lead.

This test is used with the visual earth bond and insulation tests to fully test an IEC lead.



TEST 4 - IEC Polarity/Continuity Test

Warning

a) Do not touch the appliance while testing is in progress. A high voltage of 500V DC is produced during the insulation test.

b) Ensure that the earth clip of the bonded earth test cable is securely attached to this appliance. A poor connection may introduce arcing of the contact.

c) The appliance will be automatically energised during the earth leakage test. Care should be taken that no ill effects can occur when the appliance commences operation.

d) Where it is unclear which Class of insulation applies to the appliance being tested it is recommended that the manufacturers operating instructions be consulted.

e) It is recommended that the operation of the IT4900 is periodically checked by testing an appliance of known electrical characteristics.

f) Tests should not be carried out while a printer or computer is connected to the instrument. In remote mode a Di-Log isolating cable should be used.

g) Only specialist users require fault levels below 1MW. Check with equipment supplier before using these settings.

h) During earth bond tests it is recommended that any earth conductor should be moved during the tests and if the display reads greater the selected pass level this may indicate a faulty conductor.

5. OPERATION

The IT4900 is micro processor controlled and designed to be extremely user friendly and guide the operator through the testing sequence.

The instrument will make clear statements concerning the test or condition of the equipment and ask the operator to confirm or deny the status. e.g. in the case of setting the test mode the display prompts automatic test? Y/N.

If the operator wishes to use the automatic test sequence he presses the Y and the instrument records the choice and proceeds to the next step.

If the operator wishes to use the manual mode he presses N.

In this case the display will present the message manual test mode? Y/N.

The operator then will press the Y to confirm that he wishes to use the manual test sequence. Should the operator wish to change his mind he should press N and go back to the beginning of the sequence.

If the IT4900 has been unused for several months it is recommended that it be switched on for several hours before use to ensure the memory back up battery is in a healthy state of charge. Check memory for corruption and if in doubt clear before use.

(The hash (#) sign represents the enter command and advises the micro processor that a selection has been made and it should action the request.

Note: No action will follow unless the hash sign has been depressed.)

STEP 1

Connect the IT4900 to the mains supply.

Display: Pass Data Check Sum

Display: Is this right Y/N
16 May 90 (16:05:90)

If the date is correct depress the **Y** key and the programme will sequence to the next instruction.

If the date is not correct press the **N** key and the instrument will then lead the user through a sequence of setting day, month and year.

At the end of this sequence the new date will be displayed and the user asked to confirm whether it is correct or not. (Should the user make an error during the set up procedure of the date he will now have the opportunity to correct this.)

Direct User Control Mode

1. At the prompt:

   PRESS # FOR NEW TEST

   simultaneously depress the **1** and **7** keys on the keypad.

2. The following screen will appear:

   1=SET I(12A); 2=EARTH
   3=INS; 4=LKGE; 5=CONT

3. By using the keypad numbers as directed, the user may set the earth current and perform just an individual test.

4. The D.U.C. mode does not require appliance identification as the tests performed in this mode are not logged in memory.

STEP 2

Display: Input Test Item Number

Press # or use wand.

(Each appliance may be allocated an alpha/numeric code of up to 10 digits).

The ALPHA characters are obtained by pressing the **CLR/∝** key and then scrolling up or down through the alphabet using ↑ or ↓.

Having selected an ALPHA character press # to enter it into the code.

The numerical characters are obtained direct from the keypad.

When the desired code is completed press # ONCE only to enter code into memory.

The instrument will ask:

"Is this right? Y/N.

The user may then re-check and respond accordingly.

STEP 3

Display: Input Test Code? Y/N

At this stage the operator is being asked to select either the test code or normal operation. If normal operation is required then answer **N** and proceed to step 4.

The test code can be entered by the keypad or by the bar wand. The test code has been added to save time by avoiding the requirement for repeated input of information and takes the form of:

Digit 1 Must be a 1

Digit 2:
0 = No Visual Check, appliance mode
1 = Visual Check, appliance mode
2 = No Visual Check, lead mode
3 = Visual Check, lead mode

Digit 3:
0 = Class 2
1-9 = earth fault limit (m ohm)

Digit 4: earth fault multiplier
0 = xl
1 = x10
2 = x100
3 = x1000

Example: To select 0.4 (ohm) earth fault
Digit 3 must be a 4 Digit 4 must be a 2
0.004 x 100 = 0.4Ω

Digit 5: earth test current
0,1 = 0.1A
2 = 4A
3 = 6A
4 = 12A
5 = 20A
6 = 25A

Digit 6:
0 = skip insulation test
1-9 = insulation fault limit (x0.01 MOhm)

Digit 7: insulation fault multiplier
0 = x10
1 = x10
2 = x100
3 = x1000

Digit 8:
0 = skip mains leakage test
1 = 0.25mA limit
2 = 0.75mA limit
3 = 1.25mA limit
4 = 2.00mA limit
5 = 3.00mA limit
6 = 3.50mA limit
7 = 4.00mA limit
8 = 5.00mA limit
9 = 7.50mA limit

Digit 9:
0 = No repeat test
1 = Repeat test

Digit 10:
0 = No earth repeat, no insulation repeat
1 = repeat earth, no insulation repeat
2 = no earth repeat, repeat insulation
3 = Repeat earth, repeat insulation
} including continuity check

4 = No earth bond repeat. No insulation repeat
5 = Repeat bond earth. No insulation repeat
6 = No earth bond repeat. Repeat insulation
7 = Repeat earth bond. Repeat insulation
} omit continuity check

STEP 4

Display: Automatic Test Y/N or Manual Test Y/N

Instrument will default to last used option.

At this stage the operator is being asked to select either the automatic sequencing of tests or the manual sequence.

An automatic sequence will allow the tester to apply 5 second test sequences of each test and will ask for a prompt at leakage test stage.

Manual mode requires the operator to depress the hash key in between each test in order to sequence to the next test.

It should be noted that for safety reasons tests are only performed in the sequence detailed under the section headed application.

STEP 5

Display: Class 1 Test Y/N or Class 2 Test Y/N

Instrument will default to last used option.

(The tester is now asking the operator to advise it which Class of insulation appliance is being tested.)

By pressing the **Y** key he will confirm a Class 1 appliance is being tested. (Pressing the **N** key will result in the display prompting the question "Class 2 Test Y/N.")

The user then presses **Y** key and will be prompted for the earth test current which is selectable at 0.1, 4, 6, 12, 20 or 25 Amps.

The user then presses **Y** key and will be prompted for the earth fault fail resistance specified by the external standards which apply to the instrument under test. This resistance will be 0.5Ω or 0.1Ω.

STEP 6

Display: Visual Check Y/N

The tester is now asking the operator is a visual inspection is to be carried out. By pressing the **Y** key, 3 questions are then posed:-

i) Is lead OK Y/N

ii) Is case OK Y/N (This question is omitted for IEC lead test)

iii) Is fuse OK Y/N

In automatic mode, tests will be terminated if any of the questions are answered with a 'NO'.

Memory will record visual check as a pass/fail or skip.

STEP 7

IT4900 is now ready to commence testing.

Display: Connect Appliance

Press # to start

The tester will now perform each test for a five second period. Before depressing the hash button the operator should ensure that the connections are correct, the appliance is switched on and that the earth bond lead is attached to the Class 1 appliance.

Only in manual and test code mode are 3 Earth bond and 3 Insulation tests available.

The results of each test will be displayed with either a pass or fail indication depending upon whether the measurement is within or outside the preset test limits.

When a test fails the IT4900 will stop and skip all further tests in the automatic mode or prompt to proceed in the manual mode. This action is taken on the grounds of safety and the operator should consider whether it is wise to proceed.

STEP 8

The operator will be prompted to enter a user code of up to ten alpha numeric characters (see step 2).

If no code is given 0000000000 is recorded. The code can be used to identify retest dates, departments, users etc.

If more than eight characters are inserted then the last eight will be recorded as the code.

STEP 9

After the tests have been completed the display will prompt the user to remove the test leads and then ask for the next appliance number to be entered.

If no further tests are to be performed the instrument may be switched off from the mains supply.

Note: Always switch the appliance tester off when not in use.

Range Limits

Upper and lower limits have been set for each range; reading above the upper level are held at the upper value preceded by . Reading below the lower level are held at the lower value preceded by .

e.g. Upper earth impedance level is set to 20.00Ω
Upper insulation level is set to 300MΩ
Lower earth leakage level (class 1) is set to mA

Other Commands

Abort: Depressing this key at any time will result in the test sequence being interrupted and the program being reset.

Data: Using this key the operator will be put in command of recalling the test results contained within the memory.

The program will lead the user through the steps which allows for recall on the display or onto a printer (See Printer Options)

Clear/∝ : Clears the display and depending upon sequence in program may reset the program to the start sequence.

At other stages in the program it is used to call up alpha characters.

Printout Format

Example of Printout

TEST NUMBER	0001	Test number auto increment
DATE	31 MAR 92	Set by operator
APP NO	0000000001	Any 10 character No.
TEST MODE	MAN	Selectable
VISUAL CHECK	P	Visual Check result
EARTH CURRENT	12A	Test current
EARTH	00.033 OHM P	Measured Value
EARTH	00.032 OHM P	Measured Value
EARTH	S	Skipped Test
INS	300.00 MEG P	Measured Value
INS	S	Skipped Test
INS	S	
LEAKAGE	0.00 mA P	Measured Value
LEAD CONTINUITY	P	IEC lead result
USER	1234567890	User Code

Note:

P: Test Pass
S: Test Skipped
F: Test Failed
T: Test terminated

MAN: Manual Mode
AUTO: Automatic Mode
TEST: Test Code Mode
A: Aborted

Memory Recall

Up to 500 test results are recorded in the instrument's memory. To review the information press the send data key at the beginning of the new test sequence.

The display will prompt with a question confirming the send data procedure. Press **Y** to proceed or **N** to return to the test sequence.

The display will then prompt with a question asking if the information is to be sent to the serial port.

Press **Y** to confirm. Press **N** if the data is to be displayed on the L.C.D.

The user is then asked if the data is to be sent from the start.

Press **Y** to confirm. Pressing **N** will result in a prompt for the test item number.

Once entered, press **#** and data will be sent from this test item number.

By depressing the **#** button the display will move through each line of the test results, holding the button down will cause the display to move rapidly through the test results.

The data will continue until all results have been displayed.

To exit this stage depress and hold down the Abort button.

Note: When multiple tests have been performed the IT4900 will automatically output the worst case.

Memory Clear

Should the memory be required to be cleared of its contents the following sequence should be followed:

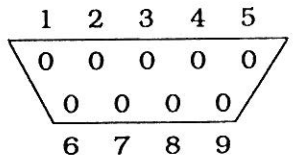
PRESS: ABORT
PRESS: CLEAR

The display will ask for confirmation of the desire to clear memory. The unit will check its memory.

Data Input/Output

A 9-pin D type connector is located at the lower right corner of the lid panel.

The data output uses RS232 levels using +/-5VDC



Pin 5	Ground, Earth
Pin 3	Data out
Pin 2	Busy/Data in
Pin 4,6-9	No connection

For a printer/computer the set up data is as follows:-

Baud Rate 9600
Start Bits 1
Stop Bits 2
Data Bits 8
No Parity

For a bar wand recorder the set up data is as follows:-

Baud rate 9600
Stop bits 2
Data bits 8
Intercharacter Delay 20ms

Integral Barcode Reader Configuration

1. At the prompt

   PRESS # FOR NEW TEST

   plug the barcode reader into the I/O part on the IT4900.

2. Simultaneously depress the **3** and **9** keys on the keypad.

3. The IT4900 will now automatically send the required codes for barcode reader set up and the barcode reader will be configured.

4. Test the barcode reader on a suitable beaconed for verification of configuration.

6. MAINTENANCE

The IT4900 is a rugged quality instrument, however care should be taken, failure to do so will reduce the instrument's life and hinder its reliability.

1. Always check all test leads for signs of damage prior to use.

2. Keep the appliance tester clean and dry.

3. Avoid testing in conditions of high electrostatic or electromagnetic fields.

4. Check memory for corruption prior to each period of operation. If in doubt clear memory.

5. No attempt should be made to gain access to the instrument while under test conditions.

6. Maintenance should only be performed by authorised personnel.

The IT4900 contains no user replaceable parts. In the unlikely event of a fault the product should be returned to an authorised dealer.

Note: In order to maintain reliability of stored data, it is necessary that the battery is kept in a healthy state of charge. A full discharged battery will take 16 hours to recharge fully.

Should the IT4900 require service, repair or calibration return the equipment to a recognised dealer or to Di-Log Instruments Ltd, 7 Croftwood Square, Martland Mill, Wigan, Lancashire WN5 OLG, England stating the full description of the fault. The product should be returned post paid where, upon receipt, the owner will be advised of any costs prior to work commencing.

7. IT4900 SPECIFICATION

Earth Bond Test

Typically 4.5V rms

Test Current	.1, 4, 6, 12, 20 25A nominal into SC
Pass Limit	0.1 or 0.5 ohms (manual or automatic) 1m ohms to 20 ohms selectable in decade steps (test code)
Readout Range	0 to 20 ohms
Accuracy	At 0.1A test current ±15% (10 ohms to 20 ohms) ±2 digits At other tests currents ±5% (50m ohms to 20 ohms) ±2 digits

Insulation Test

Test Voltage	500V nominal
Pass Range	2, 7M ohms (manual or automatic) 0.1 to 300M ohms in decade steps (test code)
Readout Range	0.1 to 300M ohms
Accuracy	±8% 1-50M ohms

Earth Leakage Test

Pass Limit	0.75mA, 3.5mA
Readout Range	0.5mA to 8.9mA
Test Voltage	Mains supply
Accuracy	±10% ±60 Micro amps

Polarity Check

L - L	
N - N	at 0.5A, 6V nominal
Pass Range	Pass or Fail.

General

Size	Width	250mm
	Depth	212mm
	Height	140mm
Weight	5Kg	

Fuses - 240V Versions

Plug Fuse	13A to VS1362
P.S. Fuse	F1A

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