

Check out what else you can get from Martindale:

- 18th Edition Testers
- Accessories
- Calibration Equipment
- Continuity Testers
- Electricians' Kits
- Environmental Products
- Full Calibration & Repair Service
- Fuse Finders
- Digital Clamp Meters
- Digital Multimeters
- Labels
- Microwave Leakage Detectors
- Motor Maintenance Equipment
- Multifunction Testers
- Non-trip Loop Testers
- Pat Testers & Accessories
- Phase Rotation Testers
- Proving Units
- Socket Testers
- Thermometers & Probes
- Test Leads
- Voltage Indicators
- Specialist Metrohm Testers (4 & 5kV)
- Specialist Drummond Testers

Martindale Electric Company Limited
Martindale Electric Co Ltd,
Metrohm House, Imperial Park, Imperial Way,
Watford, Hertfordshire, WD24 4PP, UK
Tel: +44(0)1923 441717 Fax: +44 (0)1923 446900

E-mail: sales@martindale-electric.co.uk
Website: www.martindale-electric.co.uk

© Martindale Electric Company Ltd.
Registered in England No. 3387451.
Rev 1. 2018
FIRMWARE VERSION 6.1 ONWARDS

INSTRUCTIONS

**FIRMWARE
VERSION
6.1
ONWARDS**

MICROPAT+ PAT TESTER

MARTINDALE
● ● ● **ELECTRIC**

Trusted by professionals

SAFETY INFORMATION: Always read before proceeding.

WARNING

These instructions contain information and warnings that are necessary for safe operation and maintenance of the MicroPAT+. It is recommended that you read the instructions carefully and ensure the contents are understood. Failure to understand the instructions and comply with warnings and instructions herein can result in serious injury, damage or even death.








In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC rms, 42V AC peak or 60V DC. Never exceed the maximum allowable input level for each function and range. Refer to the specifications for maximum inputs. Never touch exposed wiring, connections or live circuits.

The MicroPAT+ must only be used in conditions and for the purpose which it has been constructed. Attention should be paid to safety instructions, technical specifications and use of the MicroPAT+ in dry surroundings.

Always inspect your meter, test leads and accessories for any sign of damage before use. If any abnormal conditions exist (e.g: broken test leads, cracked case, display not reading, etc.), do not attempt to use it. Do not expose it to direct sunlight, excessive temperature or moisture.

**Keep these instructions for future reference. Updated instructions and product information are available at:
www.martindale-electric.co.uk/instruct.html**

SYMBOLS:

-  **Equipment complies with relevant EU Directives**
-  **AC (Alternating Current)**
-  **Ground**
-  **Direct Current**
-  **Equipment protected by Double Insulation (Class II)**
-  **Caution - refer to accompanying documents**
-  **Caution - risk of electric shock**

5. Warranty

This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.

Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale.

Martindale's warranty obligation is limited, at Martindale's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.

4. MAINTENANCE

4.1 Cleaning

The exterior of the instrument can be cleaned with a dry clean cloth to remove any oil, grease or grime. Never use liquid solvents or detergents.

4.2 Calibration

The recommended calibration interval is 12 months.

Martindale Electric will carry out routine calibration (on a chargeable basis) if the instrument is returned, carriage paid, to the address on the final page of this document. Alternatively, a chargeable collection and return service is available.

4.3 Repair & Service

Repairs or servicing not covered in this manual should only be performed by qualified personnel. There are no user serviceable parts in this unit. Return to Martindale Electric Company Ltd if faulty, unless fuse replacement only is necessary. Our service department will promptly quote to repair any faults that occur outside the warranty period.

4.4 Storage Conditions

The MicroPat+ should be kept in warm, dry conditions away from direct sources of heat or sunlight and in such a manner as to preserve the working life of the instrument.

CONTENTS

1 Introduction

- 1.1 Description
- 1.2 Earth Continuity
- 1.3 Fuse Rating
- 1.4 Insulation
- 1.5 Run (Load)
- 1.6 Earth Leakage
- 1.7 Flash
- 1.8 Unpacking & Inspection
- 1.9 Accessories

2 Specifications

- 2.1 Technical Specification
- 2.2 Mechanical Specification
- 2.3 Environmental Specification

3 Operation

- 3.1 Start Up
- 3.2 Set Up Mode
- 3.3 Outputting Stored Records
- 3.4 Testing Appliances
 - 3.4.1 Manual Mode
 - 3.4.2 Auto Mode
 - 3.4.3 Appliance & User I.D.
 - 3.4.4 PROCEED and MAN Keys
- 3.5 110/240V Operation
- 3.6 Battery Backup
- 3.7 Table of Codes for Test Parameters

4 Maintenance

- 4.1 Cleaning
- 4.2 Calibration
- 4.3 Repair & Service
- 4.4 Storage Conditions

5 Maintenance

1. INTRODUCTION

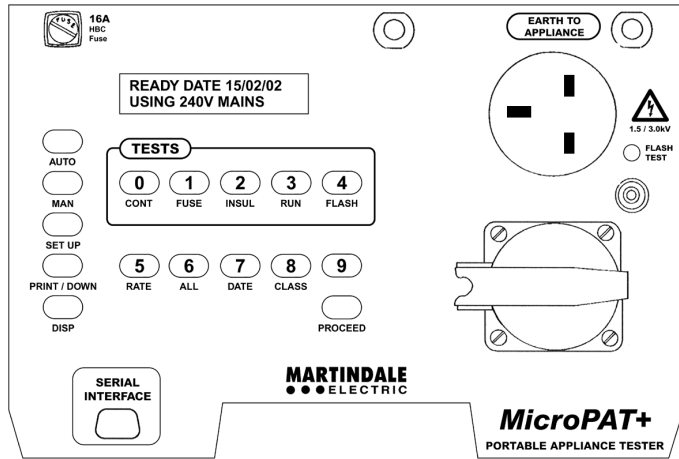


Fig. 1

1.1 Description

The MicroPAT+ microprocessor controlled Appliance Tester (Fig. 1) is housed in a robust injection moulded case with a hinged lid. The base of the case contains the complete power and electronics circuitry under the control panel. A sixteen key tactile membrane switch pad with added audio feedback operates the tester. Test leads and a comprehensive instruction manual are stored in the lid behind a shelf which carries basic operating instructions.

The MicroPAT+ can scan Bar Code labels of the Appliance I.D. and Test Parameters using an optional bar code reader. The Bar Code symbology used is code 3 of 9 (USD-3). The bar code reader is connected to the serial interface when required.

Tests carried out on both Class I and Class II electrical appliances are based on the recommendations of the Electricity at Work Act, The Health & Safety Executive and The Electronic & Business Equipment Association.

NOTE:

Class I - Earthed

Class II - Unearthed (double insulated), usually denoted by the symbol .

The MicroPAT+ can accept either 230/240V or 110V (55-0-55) 50/60Hz supplies (via a special lead adaptor). A 240V and a 110V socket on the control panel enables appliances of either voltage to be tested with the relevant mains supply.

Six tests can be performed on an appliance whose mains switch should be ON.

When the battery is nearly drained, records will be lost or only maintained for a short time and if this occurs the battery must be replaced. This battery is not user replaceable and should only be replaced by qualified personnel.

To ensure maximum protection of instrument records they should be transferred to a permanent copy on a daily basis.

Do not use the PAT as the primary store for your records.

WARNING: This product contains a lithium battery which must not be cut open, incinerated, exposed to temperatures above +60°C or recharged. “Dispose of in accordance with local regulations”.

3.7 Table of Codes for Test Parameters For Firmware Versions 6.1 Onwards

Class	Insulation Test	Run	Flash	Earth Test	Test Codes					
					Limit	0.1Ω	0.2Ω	0.3Ω	0.4Ω	0.5Ω
I	Limit 1.0MΩ	Skip	Skip	25A		01	02	03	04	05
I	Limit 1.0MΩ	Skip	Test	25A		06	07	08	09	10
I	Limit 1.0MΩ	Test	Skip	25A		11	12	13	14	15
I	Limit 1.0MΩ	Test	Test	25A		16	17	18	19	20
I	Limit 1.0MΩ	Skip	Skip	100mA		21	22	23	24	25
I	Limit 1.0MΩ	Skip	Test	100mA		26	27	28	29	30
I	Limit 1.0MΩ	Test	Skip	100mA		31	32	33	34	35
I	Limit 1.0MΩ	Test	Test	100mA		36	37	38	39	40
II	Limit 2.0MΩ	Skip	Skip	Skip	81					
II	Limit 2.0MΩ	Skip	Test	Skip	82					
II	Limit 2.0MΩ	Test	Skip	Skip	83					
II	Limit 2.0MΩ	Test	Test	Skip	84					

NOTE: Older test codes for previous versions of firmware will still work correctly. There is no distinction between ‘As New’ and ‘In Service’ so insulation pass limits will be Class I at 1.0MΩ and Class II at 2.0MΩ for all codes.

pressing the CLASS key. When the PROCEED key is pressed, if a Class I test is specified, the display indicates the continuity test parameters. Pressing the PROCEED key initiates the AUTO TEST.

3.4.3 Appliance and User I.D.

It is possible to enter appliance I.D.'s from the keyboard, or from bar codes using a bar code reader connected to the serial port. The user I.D. is entered via the keyboard. However, the keyboard is numeric, 0-9, and in order to enter letters, the following procedure must be followed. Press the SET UP key and then press the numeric keys over the range, 00-27. The character conversion table on the lid label indicates the two digit codes required for each letter of the alphabet.

3.4.4 PROCEED and MAN Keys

These are the two most used keys on the keyboard. The PROCEED key is similar to the enter key on a PC. It accepts entries and increments the sequences. The MAN key is essentially the clear key, returning the PAT to its READY mode. However, in certain circumstances, it acts as a skip key, allowing certain tests to be skipped or ignored.

3.5 110/240V Operation

The PAT has the option of carrying out any of the above tests with either 110V or 220/240V mains. This instrument can be connected directly to a 220/240V supply using the 13A plug fitted on the supply lead or to a 110V supply using the supplied adaptor. On power up, the PAT will monitor the mains supply and adjust its measurement circuits and select the correct test socket accordingly. The display will also indicate the supply voltage on which tests will be carried out. Appliances to be tested should be connected into the appropriate socket and be compatible to the supply currently in use with the PAT. i.e. 110V appliance - 110V supply.

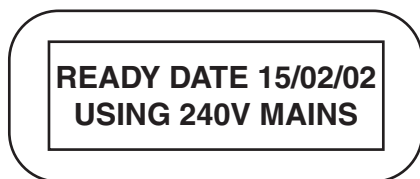


Fig. 11

3.6 Battery Backup

During times that no mains power is connected to the PAT, a battery ensures that the records stored in memory are maintained. The expected life for this battery will be approximately five years depending on use.

1.2 Earth Continuity

For this test a voltage of 6V AC is applied between the earth pin of the plug of the appliance and its exposed metalwork, via the wander earth lead. The resulting high current verifies that the protective earth path will carry fault currents in the event of a breakdown within the appliance.

Alternatively, the 100mA soft test can be selected for testing IT equipment. For this test, a constant current of 100mA DC is applied between the earth pin on the plug of the appliance and its exposed metalwork via the earth wander lead.

1.3 Fuse Rating

A low AC voltage is applied between the phase and neutral of the appliance to ensure that excessive currents will not flow when the full mains supply is used during a run test. This test is displayed but not recorded.

Note that a ruptured fuse will pass this test, since it cannot supply excessive currents. A ruptured fuse should have been found during preliminary visual tests, or will be revealed during the run test.

1.4 Insulation

500V DC is applied between the appliance phase and neutral joined together and earth to ensure that the insulation has not fallen below an acceptable level.

1.5 Run (Load)

This is an optional test that may be omitted. The appliance under test is operated at the nominal mains voltage. Care should be taken to ensure that there is no mechanical hazard with this test.

1.6 Earth Leakage

During the run test, current flow in the earth lead and wander earth lead is monitored to check that no potentially hazardous, voltage induced, earth leakage paths are created by the operating conditions.

1.7 Flash

This is an optional test that may be omitted. On Class I appliances 1.5kV AC is applied between the phase and neutral joined together and earth. The flash probe is not required for Class I appliances. However, on Class II appliances, 3kV AC is applied between the phase and neutral joined together and the tip of the flash probe which is touched onto any exposed appliance metalwork. This test is a further verification that functional and supplementary insulation levels have not deteriorated.

The tester can be run in either a manual or an automatic mode. Manual mode allows any or all tests to be performed in any sequence as desired. In the automatic mode tests are performed in a prescribed sequence. Pass/fail values are preset and the test results are displayed on a high contrast LCD.

When the automatic mode is selected the test results are stored in an internal memory with a capacity for up to 1000 sets of results. To these results are added the test number, date, appliance ID, user ID, class and visual inspection. For permanent recording the serial interface socket allows the results sequence to be printed out or downloaded into an IBM compatible computer using a suitable software package. The serial interface also allows the appliance ID and test code to be entered via a bar code reader (available separately from Martindale Electric).

1.8 Unpacking & Inspection

Before unpacking the MicroPat+, examine the shipping carton for any sign of damage. Unpack and inspect the MicroPat+ for any damage. If there is any damage then consult your distributor immediately.

1.9 Accessories

Bar Code reader MARBARCCD.

Universal extension lead tester MARLTDV.

Full range of appliance labels.

Computer download lead MARTL125 (serial interface - can be used in conjunction with a MARPATUSBADAPT for USB connection)

3 Phase PAT test adaptors.

2. SPECIFICATIONS

2.1 Electrical Specification

Supply Voltage: 230/240V $\pm 10\%$ 50/60Hz

110 (55-0-55)V $\pm 10\%$ 50/60Hz

Power Consumption: 10/220VA (excluding run)

EARTH CONTINUITY TEST

Test Voltage: 6V AC nominal with no load

Test Current: 25A AC nominal with 0.1 Ω load
100mA DC constant current (soft test) for IT equipment

Pass Level: <0.1, 0.2, 0.3..... 0.9, 1.0 Ω

Range: 0 - 1.99 Ω

Accuracy of Indication: $\pm 10\%$ ± 2 digit of reading

Fuse Rating Test

Test Voltage: 6V AC nominal

Range: 0 - 19.9A AC

Accuracy of Indication: $\pm 10\%$ ± 2 digit of reading

If a run test is required then press the RUN key. The run test limit will momentarily be shown then the display will prompt for the removal of the wander earth probe.

NOTE: Prior to starting a run test the PAT automatically performs a fuse test. If this indicates that the likely run current will exceed the preset limit the test will not be started but will indicate that the likely start current will be high (see fuse test). If the appliance is known to have a high initial current which will rapidly fall to a steady value within the fuse rating then continue the test by releasing then re-applying the PROCEED key otherwise stop the test and check the appliance.

The display will momentarily show the test limit and then a warning to remove the wander earth. By pressing and holding the PROCEED key, the appliance will power up and the measured VA rating be displayed.

Release the PROCEED key, after a short delay the display will change to displaying the leakage current measured between the supply phase and earth.

WARNING: If the fuse in the PAT ruptures it **must** be replaced with a fuse as specified on page 8. Fitting of any other type or rating of fuse is hazardous and may result in damage to the PAT.

If both the run and earth leakage current are within limits then the display will move on to prompt for a flash test. If a flash test is to be carried out then operate the FLASH key. The display will show a high voltage warning along with a prompt to press the PROCEED key. Press the PROCEED key to start the test. Once started the test will run for ten seconds after which the result will be shown for a short period then the display will revert to prompting for another flash test. This procedure can be repeated three times. With Class II appliances a prompt for the use of the flash probe is displayed.

Pressing the PROCEED key in place of the RUN or FLASH keys, in the run or flash tests will cause those tests to be skipped.

At the end of the series of tests, a prompt to save the results appears on the display. Pressing the PROCEED key will cause the PAT to store these test results, and return to the READY mode. If the MAN key is pressed, the PAT returns to its READY mode with no test results stored. During an auto test, when the PAT prompts for the entry of a test code, it is possible to skip this operation by pressing the MAN key, and the pat then performs an auto test sequence comprising of a continuity, fuse, insulation, run and flash test. In this mode of operation, the test types (25A or 100mA and In Service or As New) and the pass limits (0.1 to 0.5 Ω and Class I or Class II) defined in the set up mode determine the test parameters. After the MAN key is first pressed, the display indicates the insulation test parameters and it is possible at this stage to alter the class by

and then the user I.D. will appear as already described. The prompt to enter the test code will now be displayed. A number obtained from the "Table of Codes for Test Parameters" should now be entered via the keyboard or from a bar code reader connected to the serial port. Once the correct test code is displayed, then the PROCEED key should be pressed to continue with the test. Once the correct type of test has been set on the display operate the PROCEED key to continue with the test.

If a Class I type test has been selected the display will then identify the type of continuity test and the continuity pass limit. On pressing the PROCEED key, the display will change to prompt for the earth wander.

The wander earth should then be carefully attached to any exposed metalwork on the appliance and the PROCEED key pressed to start the test.

The display will indicate that the continuity test is running and after five seconds it will momentarily show the test result.

If the result of this test is within the pass limit, the display will then change to indicate that the fuse test is running and will then move on to the insulation test. This test will run for 5 seconds, during which time the insulation of the appliance is stressed with 500V DC and the insulation resistance is measured.

If the continuity or insulation test fails, the rest of the test sequence is discontinued and when the PROCEED key is pressed, the prompt for saving the test results will appear on the display.

If Class II double insulated appliance test is selected then the continuity test is omitted. The display will prompt for the wander earth to be fitted to any exposed metalwork on the appliance to ensure that the insulation test will be valid.

If there is no exposed metalwork on the appliance, metal foil should be wrapped around the appliance and the wander lead clip attached to the foil.

Press PROCEED to start the fuse test. The display will indicate that the fuse test is running and after five seconds it will momentarily show the test result and move onto the insulation test. This test will run for five seconds, during which time the insulation resistance is measured.

If the insulation test fails, the rest of the test sequence is discontinued, and when the PROCEED key is pressed, the prompt for saving the test results will appear on the display.

INSULATION TEST

Test Voltage: 500VDC -0%, + 20% at 0.5MΩ
Short Circuit Current: 1.5mA DC nominal
Pass Level: >1MΩ Class I } There is no distinction between
 >2MΩ Class II } As New or In Service pass levels
Range: 0 - 19.9MΩ
Accuracy of Indication: ±5% ±1 digit of reading

RUN TEST

Range: 0 - 3.1kVA
Pass Level: <3.1kVA at 240V AC/<1.43kVA at 110V AC
Accuracy of Indication: ±10% ±100VA at nominal 240V mains supply
 ±10% ±50VA at nominal 110V mains supply

EARTH LEAKAGE TEST

Range: 0 - 6mA AC
Pass Level: <3.5mA AC Class I, 0.5mA AC Class II
Accuracy of Indication: ±10% ±1 digit of reading

FLASH TEST

Test Voltage: 1.5kV AC - Class I } at nominal
 3.0kV AC - Class II } 240V mains supply
Pass Level: <3mA AC
Range: 0 - 3mA AC.
Accuracy of Indication: ±5% ±1 digit

LEADS

Mains: 1.7m fixed lead, with a 13A moulded plug
Earth Continuity: 1.5m long, fixed lead, heavy duty crocodile clip
Flash Test: 1.3m long, detachable, with a retractable probe at one end and a shrouded free 4mm safety high voltage plug at the other.
Adaptor: 110V 16A plug at one end and a 240V 13A free socket at the other.

SOCKETS

Mains: 240V 13A to BS1363
 110V 16A to BS4343

Serial interface: Printer/computer output using a 9 pin 'D' type connector
Pin 9: +5V
Pin 5: Earth/ground
Pin 3: Data out (TX)
Pin 2: Busy (RX)
Pin 7: Earth/ground
RS232 +5V DC levels at a communication speed of 1200 BAUD with 8 data bits, no parity and 1 stop bit
4mm high voltage safety type

Flash:

LAMPS

Flash: Neon lamp which illuminates when a flash test is selected

FUSES

Panel: 16A(FF) 11/4" HBC (Ceramic) - 2 spares supplied
13A Plug: 13A(F) 1" HBC (Ceramic)
Internal: 3.15mA(F) HBC 5 X 20mm (Ceramic)
N.B: Internal fuse is not user replaceable. The front panel fuse protects the 240V test socket only. The 110V socket is wired direct to the mains input plug fuse. Exact replacements must always be used.

DISPLAY

LCD: 2 lines X 20 character. Supertwist liquid crystal high contrast display

EMC Compliance: Meets EN 50081-1, EN 50082-1

LVD Compliance: Meets BS EN 61010-1, Installation Category II, Pollution Degree 2

2.2 Mechanical Specification

CASE

Size: 330 X 263 X 144mm
Material: ABS
Colour: Yellow
Weight: 4.75kg complete

basis but should only be used for type testing or after major repairs have been carried out which may have modified the characteristic insulation properties of the appliance.

NOTE: Due to the high voltages present during this test it should only be carried out by suitably trained operators.

Press the FLASH key. The display will momentarily show the flash test limit then go to show a high voltage warning.

If the appliance is a Class II device then plug in the flash probe. Hold the probe tip firmly against any exposed metal surfaces on the appliance for the duration of the flash test sequence.

Press and hold the PROCEED key. The orange flash indicator will illuminate and the flash leakage current will be measured and shown on the display for as long as the key is held down. Three seconds after the key is released the display will revert to the ready mode.

If the leakage current exceeds the preset limit the PAT will automatically switch off the high voltage and the display will indicate a fail condition.

3.4.2 Auto Mode

In this mode of operation a complete test sequence can be automatically carried out and the results stored in memory.

Press the AUTO key. The display will indicate a VISUAL FAIL condition, press the ALL key to change to VISUAL PASS if the visual inspection of the appliance under test shows no indication of mechanical faults. Press the PROCEED key to accept pass/fail condition.

If the visual inspection has failed then no electrical tests will be carried out and the prompt to enter the appliance I.D. will be displayed. The appliance I.D. may be entered via the keyboard or from a bar code via a bar code reader connected to the serial port. The PROCEED key is pressed to accept the appliance I.D. or the MAN key may be pressed to return to the ready screen, with no records being stored. If the appliance I.D. has been accepted, the prompt to enter the user I.D. is displayed. The user I.D. may be entered via the keyboard and accepted by pressing the PROCEED key. If the MAN key is pressed, then the user I.D. is not stored. The prompt to save the test results is displayed. Pressing the PROCEED key will store the test results and return the PAT to the READY mode. If the MAN key is pressed, the test results will not be stored.

If the visual inspection has passed, then the prompt to enter the appliance I.D.

tested, this will either be Class I or Class II and the pass test limit. If the displayed type does not match the appliance to be tested then press the CLASS key to change displayed type.

Press the PROCEED key to move onto the next display. If the appliance type is Class II then this will be a prompt to fit the wander earth. This should be carefully connected to any exposed metal on the appliance.

Press the PROCEED key to move onto the next display which will be a warning of high voltage. Class I tests will skip the wander earth prompt as there is already an earth return in the appliance lead.

Press and hold the PROCEED key. The display will show the measured value then revert to the ready mode three seconds after the key has been released.

NOTE: It is important to test the earth continuity in a Class I appliance prior to this test otherwise this test may not be valid.

d) Run

Full mains supply is applied to the appliance. The measured running power and earth leakage current are displayed.

Press the RUN key. The display will momentarily show the run power limit then go on to show a warning to remove the wander earth if it is fitted.

Press and hold the PROCEED key. After a short delay the display will show the power used by the appliance. After the key has been released the display will change to show the earth leakage current for three seconds then revert to the ready mode.

If at any time the measured earth leakage or the run current exceeds the preset limit the test will automatically be stopped.

e) Flash

Flash voltage is applied:

i) Between the mains lead phase/neutral and the earth for a Class I instrument (test voltage 1.5kV).

OR

ii) Between the mains lead phase/neutral and the flash probe for Class II instruments (test voltage 3kV). This test severely stresses the insulation of the appliance under test and should not be carried out on a routine maintenance

2.3 Environmental Specification

TEMPERATURE

Operating: 0°C to 35°C
Storage: -10°C to 50°C

3 OPERATION

3.1 Start Up

Connect the appliance tester to a suitable supply. The tester will start up in self test mode. This will run for approximately 3 seconds during which the display will show 'self test' and the software version. All push-button keys are disabled. Do not interrupt the supply during the self test mode as the tester requires this period to recognise the mains voltage being supplied. To do this will not damage the tester but may corrupt stored test results.

At the end of the self test the display will show the - READY - screen showing the last entry date and the mains supply which is connected to the PAT. See Fig. 2.

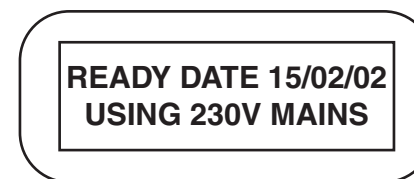


Fig. 2

3.2 Set Up Mode

Any time the instrument is in the ready mode the following setting up operations can be carried out on the instrument prior to starting tests.

When the 'Set up' key is pressed a set up menu is displayed allowing class, continuity, test records and date to be set or modified as required.

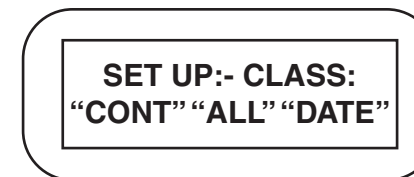


Fig. 3

a) Set Class:

Press the SET UP key. The display will show the setting options. By pressing the CLASS key, the class menu is displayed. Repeated pressing of the CLASS key allows Class I or Class II to be selected. Choosing Class I will also set up the instrument to use 1.0MΩ insulation pass limit. Class II uses 2.0MΩ pass limit.

To return to set up menu press PROCEED. Pressing the PROCEED key stores the selected class and limit and returns the display to the set up menu. Pressing the MAN key returns the display to the set up menu, without the class and limit being stored.

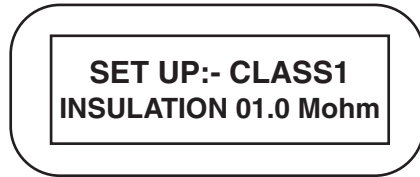


Fig. 4

b) Set Continuity:

This allows the pass limit for the earth continuity to be set and the type of test, 25A AC or 100mA DC, to be selected. For appliances with minimum lead lengths this will normally be set to 0.1Ω. As a guide the following is a table for the maximum lead lengths which should result in a pass with the 0.1Ω setting.

Cross section	Max length	Cable rating
0.5mm ²	2 metres	3 amps
0.75mm ²	3 metres	6 amps
1.0mm ²	4 metres	10 amps
1.5mm ²	6 metres	15 amps

To establish the maximum cable lengths permissible for other limits of earth continuity divide the new limit by 0.1 and multiply by length for 0.1Ω.

e.g. Maximum cable length for 0.5mm² on 0.1Ω limit = 2 Metres
Maximum cable length for 0.5mm² on 0.2Ω limit = (0.2 : 0.1) x 2
= 4 Metres

Press the SET UP key. The display will show the setting options. Select CONT by pressing the CONT key. The display will show the window for selecting the type of test (see Fig. 5).

a) Earth Continuity

This test is only required for earthed (Class I) appliances. The resistance of the earth circuit in the appliance and associated mains wire and plug is displayed. Press the CONT key. The display will show the set earth continuity test limit and the type of test. The type of test, 25A or 100mA, may be selected by pressing the CONT key. The PROCEED key should then be pressed, the display will prompt for the wander earth to be fitted. Carefully fit the wander earth lead to any exposed earthed metal on the appliance then press and hold the PROCEED key. The display will show the measured value for the appliance for as long as the key is held down then will revert to ready mode after three seconds.

b) Fuse

The current likely to be drawn whilst the appliance is powered up is displayed. Apart from identifying phase to neutral shorts this test is useful in establishing the likely rating for appliance mains fuse.

Press the FUSE key. The display will momentarily show the fuse test limit then prompt for the PROCEED key. Press and hold the PROCEED key. The display will show the measured value for the appliance as long as the key is held down then revert to ready mode after three seconds. If the measured value is zero or very low compared with the expected value then it is likely that the appliance phase is open circuit due to incorrect wiring, a ruptured fuse or the appliance mains switch is not in the ON position.

NOTE: The value displayed is an indication of the current likely to be taken by the appliance at initial switch on. Purely resistive loads may be a good indication of the steady state current drawn by the appliance. With appliances which have very high start up currents the display will show the likely maximum current drawn by the appliance before the steady state condition has been achieved.

This value along with the steady state current is useful in establishing the likely fuse type suitable for the appliance.

Examples of appliances which may have high start up currents are power tools, industrial cleaning equipment, stage and site lighting.

c) Insulation

The integrity of the insulation of the appliance is tested by applying 500V DC between phase/neutral linked together and earth. The measured insulation resistance is displayed. Two pass levels are built into the test; these are 1.0MΩ (Class I), 2.0MΩ (Class II). There is no distinction between 'As New' or 'In Service' pass limits. Allow a short press PROCEED to clear all the records or MAN to return to the set up menu with all records retained unchanged.

Press the INSUL key. The display will indicate the type of appliance which is to be

The Print/Disp options are as follows:

a) All

Selecting this option by pressing the ALL key when the all option is displayed will cause all the records stored to be output to the display/printer.

b) Appliance ID

Selecting this option by pressing the PROCEED key will result in the display prompting for the I.D. of the appliance to be displayed. Enter the appliance I.D. then press the PROCEED key. All test records stored in memory for that appliance I.D. will then be output to the display/printer starting from the first (oldest) record stored and include all the following records up to the most recent record stored in memory.

c) Last

Selecting this option by pressing the PROCEED key will result in the last record stored in memory to be displayed/printed.

d) From

Selecting this option by pressing the PROCEED key will result in the display prompting for the low and high test number required to describe a block of records which it is desired to view. The cursor will be positioned below the first test number to be entered. Enter the lower number using the number keys then press the PROCEED key to move the cursor to the high number. This will automatically be set to the highest test number stored in memory. If a lower test number is required for the top of the block this can be set in simply by overwriting the displayed number. Pressing the PROCEED key outputs all the records in the block. Pressing the SET UP key will clear the number that has been entered.

3.4 Testing Appliances

Two distinct methods of testing appliances are available with this appliance tester.

3.4.1 Manual Mode

This mode can be entered any time the PAT is in its ready mode simply by selecting the appropriate test key. With manual mode it is possible to carry out individual tests on appliances without having to complete a full auto test. This can be a useful aid to quickly establish that a repaired appliance is likely to pass an auto test or just to establish that an earth bond has been correctly made for example. The results obtained from manual tests are not stored in memory. The manual tests which can be carried out with this PAT are as follows:

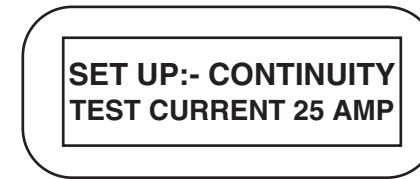


Fig. 5

Pressing the CONT key selects either a 25A or 100mA test.

By pressing the SET UP key, the window for selecting the continuity pass limit is displayed (see Fig. 6).

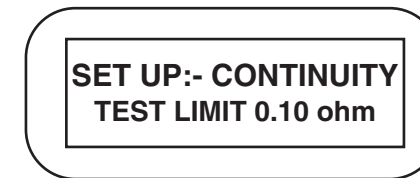


Fig. 6

Repeated pressing of the CONT key will cause the displayed value to increment by 0.1Ω. Press PROCEED to fix the displayed value in the memory and return to the set up menu. Press the MAN key to return to the SET UP menu without storing the continuity pass limit.

c) Clear all Test Records

This allows all test records stored in the memory to be erased thereby making space for new records.

Press the SET UP key. The display will show the setting options. Select all by pressing the ALL key. The display will show a prompt to press the PROCEED key to clear all records.

Press PROCEED to clear all records or MAN to return to set up menu with all records retained unchanged.

d) Set Date

This has to be set up daily as follows:

Press the SET UP key. The display will show set up menu (see Fig. 3). Select the

date setting by pressing and releasing the DATE key. The display will show the last date set with a cursor under the first digit to be changed (see Fig. 7). Change the first pair or numbers in the date shown if required then press the PROCEED key to move on to the next pair and repeat the process until the cursor is under the date's year digits.

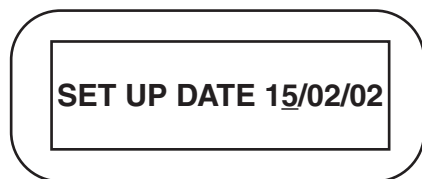


Fig. 7

Press the PROCEED key to fix the new date into memory or press the MAN key to return to the set up menu with the original date unchanged.

If the date set during this process is invalid, e.g. 35th day of the month the cursor will return to the wrongly set numeric ready for correction when the final PROCEED key press is made.

3.3 Outputting Stored Records

Test data previously stored in the PAT memory can be viewed or printed using the DISP or PRINT keys respectively.

NOTE: If records are to be printed, a printer must be correctly connected to the serial port and must be switched on and ready to receive data. However, some printers can appear to be readers and so can cause corruption when the applied ID or test code required to be entered. Therefore, it is recommended that the printer is only connected when the PAT is about to download information to it.

To display a test record press the DISP key. The display will then show the option to output all the records (see Fig. 8).



Fig. 8

Either press the ALL key to accept the displayed option or press the DISP key to show the next option which is the 'Appliance ID' (see Fig. 9).



Fig. 9

To select this option press the PROCEED key as prompted or press the DISP key to select the next option which can then be selected using the PROCEED key or skipped by pressing the DISP key as appropriate.

Pressing the MAN key at any time will result in the display reverting to the ready mode.

If the display has been selected then repeated pressing of the PROCEED key or holding it down will cause the data from the record(s) to be output sequentially to the display.

If the printer has been selected as the output device then all the data stored in the chosen record(s) will then be automatically printed.

It should be noted that when the PRINT key is first pressed, the window for selecting the baud rate of the serial port is displayed (see Fig. 10). Pressing the RATE key allows a baud rate of 1200 or 9600 to be selected. Pressing the PRINT key, the display that shows the option to output all records appears (see Fig. 8) and the operation is as described earlier except that the PRINT rather than DISP key is used.

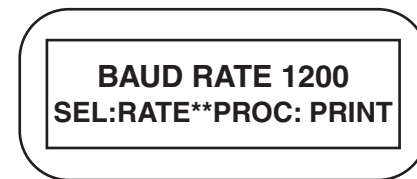


Fig. 10