HPAT500/2 HANDYPAT

INSTRUCTION MANUAL

MARTINDALE ELECTRIC

GENERAL SAFETY INFORMATION: Always read before proceeding.

Warning
These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions 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.

This product must only be used by a competent person capable of interpreting the results under the conditions and for the purposes for which it has been constructed. Particular attention should be paid to the Warnings, Precautions and Technical Specifications. Always check the unit is in good working order before use and that there are no signs of damage to it. Do not use if damaged.

Where applicable other safety measures such as use of protective gloves, goggles etc. should be employed.

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

REMEMBER: SAFETY IS NO ACCIDENT

MEANING OF SYMBOLS:

Equipment complies with relevant EU Directives

AC (Alternating Current)

Caution - refer to accompanying documents

Caution - risk of electric shock

End of life disposal of this equipment should be in accordance with relevant Local Directives

Thank you for buying one of our products. For safety and full understanding of its benefits please read this manual before use.

CONTENTS

1. INTRODUCTION

1.1 Inspection

Examine the shipping carton for any sign of damage. Inspect the unit and any accessories for damage. If there is any damage then consult your distributor.

Unpack the HPAT500 and check that you have the following accessories:
Instructions
Mains Charger Unit
Test Probe with crocodile clip (TL67)
6 x AA NiMH rechargeable batteries
IEC Adaptor Lead (Ex332)
Zip carry case

Inspect the unit and its accessories for any damage. If any item is missing or there is damage to any item, consult your distributor immediately.
Refer to section 4.1 for installation of batteries.

1.2 Description

The battery powered HPAT500 HANDYPAT is a Portable Appliance Tester with the following features:

Insulation Test
Insulation Test at 500V/250V.

Automatic Test Sequence for Fixed Pass Levels
A connection diagram is shown in this handbook and on the label on the unit. When the test type is selected, the HPAT500 will run automatically through the test sequence without any further user interaction unless a failure is encountered. Pass or Fail outcome is displayed alongside measured value.

Dual pass level on Class I Earth Continuity.
Automatic comparison against two pass levels
if ≤0.10 Ω = PASS
if ≤0.20 Ω = NOTE x.xxΩ PASS

IEC Lead Test
The HPAT500 can also be used to check IEC leads and extension leads for earth continuity, insulation, and correct polarity, (Martindale Ex332 IEC lead required for extension lead testing).

The HPAT500 will perform the following test types:
IEC Lead test sequence
Class I test sequence
Class II test sequence

2. GENERAL OPERATION & FUNCTIONS

2.1 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

⚠Warning

Before use check the unit for cracks or any other damage. Make sure the unit is free from dust, grease and moisture. Also check any associated leads and accessories for damage. Do not use if damaged. Be sure the HPAT500 is in good working order before use.

⚠⚠Warning

The HPAT500 and this instruction manual are intended for use by personnel who are adequately trained and familiar with IET Code of Practice for Portable Appliance Testing.

⚠Warning

Do not use the HPAT500 if the battery cover is not fitted.

⚠Warning

Do not connect the HPAT500 to the mains supply via the IEC inlet.

⚠Warning

Use batteries of the specified type in the HPAT500.

⚠Warning

Do not touch the appliance being tested or the test probe tip when the HPAT500 is performing an electrical test. Where possible, use the crocodile clip provided to attach the probe to the appliance.

⚠Caution
Avoid severe mechanical shock or vibration and extreme temperature.

⚠Caution
Remove the batteries from the HPAT500 when not in use for an extended period, to avoid risk of corrosion from leaking batteries. (Refer to 4.1 Fitting Batteries).

2.2 Power On/Off
Hold down the green power button for at least 1 second to power on the HPAT500. The HPAT500 will power on at the SELECT TEST screen.

To power off the HPAT500 hold down the green power button for at least 1 second.

2.3 Display Indicators

~ Flashes to indicate battery charger is connected to the HPAT500 and powered (Refer to 2.24).

+ − When flashing indicates the battery is charging. When continuous indicates the battery is fully charged.

⚠ Indicates insulation test voltage will occur at front panel mains socket, during the test sequence.

SKIP Various secondary functions are assigned to buttons
EXIT temporarily. These are indicated by suitably marked button images on the display, when they apply.

2.4 Connector Descriptions

1) UK GB mains Socket to BS1363 - used to connect the appliance under test.
2) 4mm socket - used for Class I Earth Continuity/Class II Insulation Test probe.
3) IEC input socket - used for IEC lead testing.

   ⚠ **Do not** connect to mains supply.
4) Jack socket - used to connect battery charger. 12V DC only, centre is positive.

2.5 Press Button Description

⏻ **Green Power Button** Hold for 1 second to power up or power down the HPAT500.

LEAD Selects the Lead Test automatic test sequence

CLASS I Selects the Class I automatic test sequence.

CLASS II Selects the Class II automatic test sequence.

☼ backlight LCD display button ON/OFF

250/500V Insulation Voltage Select for CLASS I & CLASS II test sequence

Buttons are assigned temporary functions at certain points in tests. Temporary function is indicated on the display for an image of the corresponding button.

2.6 Contrast Adjustment

If required the display contrast can be adjusted at power up.

To enable the contrast adjustment hold down the **CLASS II** + **ON** button at power-up.

Press the **LEAD** or **CLASS I** button repeatedly to adjust contrast as indicated on display.

Press **CLASS II** to accept and exit.

2.7 Fixed Test Settings

Insulation Test voltage	500V DC (DEFAULT)
	250V DC

Fixed Pass Levels

Earth Continuity

Lead	≤ 0.10 Ω = PASS
	≤ 0.20 Ω = NOTE x.xx PASS
Class I	≤ 0.10 Ω = PASS
	≤ 0.20 Ω = NOTE x.xx PASS

If NOTE x.xx Ω PASS is displayed, end user of HPAT should take note of the Earth Continuity resistance value and reach a pass/fail decision for the appliance.

Insulation

Lead:	≥ 1.0 MΩ
Class I:	≥ 1.0 MΩ
Class II:	≥ 2.0 MΩ

2.8 Battery Low Message
When the batteries discharge to a predetermined low threshold value, the HPAT500 will display a 'Connect charger' message.

2.9 Auto Power Down
If the HPAT500 remains inactive for a period of 10 minutes or the HPAT500 batteries approach a level where the HPAT500 can no longer function correctly, the HPAT500 will automatically power down. The message 'Auto Power Down' will be displayed on the screen for 3 seconds before Auto Power Down.

Display results will be lost when Auto Power Down occurs.

When the HPAT500 is next powered up, it reverts to Select Test screen.

2.10 Null of Test Probe Lead Resistance (Class I Earth Continuity only)
The null function is used to compensate for the test probe lead resistance when used for Class I earth continuity measurements. This also allows for the use of alternative test probes.

To null the test probe lead resistences:
- Power off the pat tester
- Attach the test lead
- Connect the test lead probe to the **EARTH** pin on the front panel 13amp test socket
- Hold down the **CLASS I** and **CLASS II** buttons while powering up the device
- The **NU** symbol on the right of the display will light up
- Within 5 seconds - Press the **LEAD** button to initiate the calibration

The unit will run through the calibration check and if the

lead passes will return with OK – you can then carry on PAT testing as normal

2.11 Charging Batteries

⚠ **Use rechargeable batteries of the specified type**
Batteries should always be in position while HPAT is in use.

A new unit or new batteries should be charged for at least 12 hours before use with the batteries installed in the unit. If the user is expecting to undertake intensive appliance testing, the instrument should be charged fully before starting, to avoid any disruption.

To charge the batteries, plug the battery charger into a mains power socket, connect the battery charger jack to the socket (4) on the HPAT500. The **~** symbol will flash on the display to show the battery charger is connected and the + − sign will flash while the battery is being charged. When the battery is fully charged the + − sign will become continuous.

The HPAT500 may be used for testing while powered from battery charger.

2.12 Inadvertent Connection of Mains Supply Voltage
If mains voltage is inadvertently applied to the HPAT500, via the IEC socket (3) at the top end, an internal buzzer will sound continuously and **'Err'** will be displayed on the HPAT500 display. All HPAT500 press buttons will be inhibited until the source of the applied voltage is removed.

This is a safety feature only. The HPAT should not be used to determine if a mains socket is live.

3 PERFORMING APPLIANCE & LEAD TESTS

⚠ Warning

The HPAT500 and this Instruction Manual are intended for use by personnel who are adequately trained and familiar with IET Code of Practice for Portable Appliance Testing.

3.1 Preliminary Checks and Set Up

⚠ Ensure that the appliance under test is NOT plugged into the mains supply when removing fuses.

Appliance Visual and Fuse Checks

- Visually inspect the appliance for any damage.
- Visually inspect the appliance mains lead and mains plug for any damage.
- Check that the fuse in the mains plug is of the correct rating (if fitted).
- Check that any accessible fuses on the appliance are of the correct rating.
- ⚠ **DO NOT** proceed with electrical testing if any of the visual or fuse checks fail.

IEC Lead/Extension Lead Visual and Fuse Checks

- Visually inspect the lead and plug for any damage.
- Visually inspect the extension lead socket for any damage.
- Check that the fuse in the plug is of the correct rating. (if fitted).
- ⚠ **DO NOT** proceed with electrical testing if any of the visual or fuse checks fail.

3.2 IEC Lead Test

⚠ Always refer to and perform 3.1 before proceeding

The following are performed:-

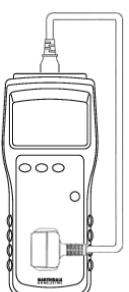
Earth Continuity measurement - measures resistance of the lead earth.

Insulation measurement - measures resistance between earth and line and between earth and neutral.

Wiring Polarity check - checks for open or short circuit wiring and crossed wiring.

Test Connections

- Refer to the IEC Lead connection diagram below.
- Plug the IEC lead plug into the HPAT500 front panel mains socket (1).
- Connect the other end of the IEC lead to the HPAT500 IEC input socket (3).



IEC Lead Connection

Automatic Test Sequence

- Press **LEAD** to select the IEC Lead test and display the test screen.
- The HPAT500 will perform the Lead Earth Continuity Test, Class I Insulation Test and wiring polarity check with no further interaction from the operator unless the test fails.

If **'FAIL'** is displayed after the Lead Earth Continuity or Class I Insulation Test, refer to 3.8 (Earth Continuity/ Insulation Failure).

Result of Test
At the end of the IEC lead test the HPAT500 will display **'PASS'** or **'FAIL'** to indicate the overall result of the test. The individual measurement results are also displayed with a **'P'** or **'F'** alongside each to indicate a pass or fail.

If **'FAIL'** is displayed after the Class I Earth Continuity or Class I Insulation Test, refer to 3.7 (Earth Continuity/ Insulation Failure).
If **'NOTE x.xxΩ PASS'** is displayed after Class I Earth Continuity Test, refer to 3.8 (Earth Continuity displays NOTE).

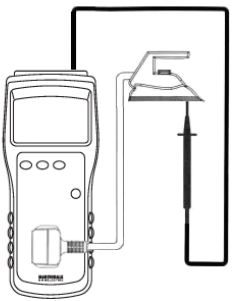
3.3 Class I Test

⚠ Always refer to and perform 3.1 before proceeding

The following are performed for a Class I appliance test:-
Fuse check - checks Live-Neutral continuity through appliance
Class I Earth Continuity measurement - measures resistance between earth and exposed metalwork.
Class I Insulation measurement - measures resistance between earth and live and between earth and neutral.

Test Connections

- Refer to the Class I connection diagram below.
- Plug the appliance mains plug into the HPAT500 front panel mains socket (1).
- Connect the test probe to the HPAT500 4mm test probe socket (2) and connect the other end to any exposed metal work on the appliance.
- Switch ON the test appliance.



Class I Test Connections

Automatic Test Sequence

- Press **CLASS I** to select the Class I appliance test and display the test screen.
- The HPAT500 will perform the fuse check, Class I Earth Continuity and Class I Insulation Tests with no further interaction from the operator unless the test fails.

If **'SWITCH ON?'** is displayed after the fuse check, refer to 3.6 (Fuse Check Failure).

If **'FAIL'** is displayed after the Class I Earth Continuity or Class I Insulation Test, refer to 3.7 (Earth Continuity/ Insulation Failure).

If **'NOTE x.xxΩ PASS'** is displayed after Class I Earth Continuity Test, refer to 3.8 (Earth Continuity displays NOTE).

Result of Test

- At the end of the Class I appliance test the HPAT500 will display **'PASS'** or **'FAIL'** to indicate the overall result of the test. The individual measured results are also displayed with a **'P'** or **'F'** alongside to indicate a pass or fail.
- If the appliance being tested has more than one instance of exposed metalwork, it is advisable to connect the test probe to each in turn and repeat the test.

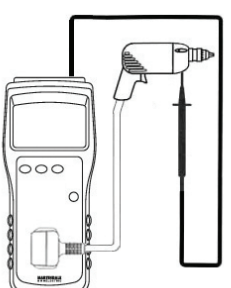
3.4 Class II Test

⚠ Always refer to and perform 3.1 before proceeding

The following are performed for a Class II appliance test:
Fuse check - checks Live-Neutral continuity through appliance.
Insulation measurement - measures resistance between live and exposed metalwork and between neutral and exposed metalwork.

Test Connections

- Refer to the Class II connection diagram below.
- Plug the appliance mains plug into the HPAT500 front panel mains socket (1).
- Connect the test probe to the HPAT500 4mm test probe socket (2) and connect the other end to any exposed metal work on the appliance.
- Switch ON the test appliance.



Class II Test Connection

Automatic Test Sequence

- Press **CLASS II** to select the Class II appliance test and display the test screen.

- The HPAT500 will perform the fuse check and Class II insulation test with no further interaction from the operator unless the test fails.

If **'SWITCH ON?'** is displayed after the fuse check, refer to 3.6 (Fuse Check Failure).
If **'FAIL'** is displayed after the Class II Insulation Test, refer to 3.7 (Earth Continuity/Insulation Failure).

Result of Test

- At the end of the Class II appliance test the HPAT500 will display '**PASS**' or '**FAIL**' to indicate the overall result of the test. The individual measurement results are also displayed with a **'P'** or **'F'** alongside to indicate a pass or fail.
- If the appliance being tested has more than one instance of exposed metalwork, it is advisable to connect the test probe to each in turn and repeat the test.
- Where the appliance being tested has one or more areas of possible insulation breakdown, such as cooling slots or cover joints, it is advisable to wrap metal foil tightly around the appliance and connect the test probe to the metal foil then repeat the test.

3.5 Extension Lead Testing

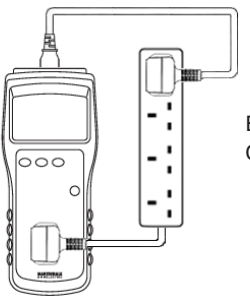
⚠ Always refer to and perform 3.1 before proceeding

To test extension leads the HPAT500 IEC Lead Test is used with connections as detailed below. Refer to 3.2 (IEC Lead Test).
A Martindale Ex332 IEC mains lead (or similar) is required to perform extension lead tests.

Test Connections

- Refer to the Extension Lead connection diagram below.
- Plug the extension lead plug into the HPAT500 front panel mains socket (1).

- Plug the Ex332 IEC lead mains plug into the extension lead socket.
- Connect the other end of the Ex332 IEC lead to the HPAT500 IEC input socket (3).
- Switch ON the extension lead, if it has a switch fitted.



Automatic Test Sequence

- Press **LEAD** to select the IEC Lead test and display the test screen.
- The HPAT500 will perform the Lead Earth Continuity Test, Class I Insulation Tests and wiring polarity check with no further interaction from the operator unless the test fails.

If **'FAIL'** is displayed after the lead Earth Continuity or Class I Insulation Tests, refer to 3.7 (Earth Continuity/ Insulation Failure)

If **'NOTE x.xxΩ PASS'** is displayed after Class I Earth Continuity Test, refer to 3.8 (Earth Continuity displays NOTE).

Result of Test

- At the end of the IEC lead test the HPAT500 will display **'PASS'** or **'FAIL'** to indicate the overall result of the test. The individual measurement results are also displayed with a **'P'** or **'F'** alongside each to indicate a pass or fail.

3.6 Fuse Check Failure

Display indicates 'SWITCH ON?'

Possible Reasons for Failure

- Appliance mains switch not set to the ON position. Rectify and restart the test,
- Appliance not correctly connected to the HPAT500. Rectify and restart the test,
- Ruptured fuse.

Remove any fuse(s) and check fuse continuity by an alternative means. Ensure that the appliance is disconnected from any mains power whilst fuses are being examined.

Re-insert any fuses.

Reconnect appliance to HPAT500, ensure operating switch of appliance is ON and restart whichever Class of test had been desired.

- Appliance internal circuitry.

If the fuse(s) are proved to be undamaged, the 'SWITCH ON?' remark on display may be due to a switching device inside the appliance that only operates when the appliance is energized at mains voltage. A 'fail' in such circumstances does not necessarily mean a fuse is ruptured or the appliance is faulty.

When the 'SWITCH ON?' message is displayed, the HPAT automatic testing can be allowed to continue by selecting 'SKIP'.

Exit Test

If it is decided that the appliance is faulty, when the 'SWITCH ON?' message is displayed, the test should be terminated by selecting 'EXIT' and unplugging the appliance from the HPAT.

Any fault in the appliance should be repaired as necessary before retesting.

3.7 Earth Continuity/Insulation Failure

Possible Reasons for Failure other than a faulty appliance or Lead

- Appliance or lead being tested not correctly connected to the HPAT500.
- Test probe is not making good contact with the appliance, or is damaged.

Rectify the problem and start the test again.

3.8 Earth Continuity displays 'NOTE'

If result for Earth Continuity is displayed as 'NOTE x.xx PASS' the instrument has granted a PASS for the Appliance under test, where Earth Continuity is higher than the lower pass level, but within the higher pass level. The advisory "NOTE.... alerts the end user, who should decide whether a pass is appropriate.

4. MAINTENANCE

4.1 Fitting Batteries

⚠ Ensure the HPAT500 is disconnected from any possible voltage sources and the HPAT500 is powered off before removing the battery cover.

⚠ Do not fit non-rechargeable batteries.

- Remove the battery cover of the HPAT500 by unscrewing the quarter turn retaining screw.
- The battery cover will now lift off.
- Fit 6 new AA NiMH rechargeable batteries, observing correct polarity.
- Replace the battery cover and secure with the quarter turn screw.

New batteries should be charged for at least 12 hours before use - See section 2.10 (Charging Batteries).

⚠ Used batteries should not be discarded with other metal objects.

Used batteries should be disposed of in accordance with current Local directives.

4.2 Calibration

To maintain the integrity of measurements made using your instrument, Martindale Electric recommends that it is returned at least once a year to an approved Calibration Laboratory for recalibration and certification.

Martindale Electric is pleased to offer you this service. Please contact our Service Department for details.
E: service@martindale-electric.co.uk
T: 01923 441717

4.3 Cleaning
The unit may be cleaned using a soft dry cloth. Do not use moisture, abrasives, solvents, or detergents, which can be conductive.

4.4 Repair & Service
There are no user serviceable parts in this unit other than batteries. Return to the place of purchase if faulty.

Before the unit is returned, please ensure that you have checked the:

- unit - leads - batteries
- fuses - poor connections - damage

4.5 Storage Conditions
The instrument 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 unit. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

5. WARRANTY AND LIMITATION OF LIABILITY

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, 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.

MARTINDALE ELECTRIC

Specification
HPAT500
HandyPAT

EARTH CONTINUITY
Test voltage: 4V DC (into open circuit)
Test current: 200mA DC (into short circuit)
Range: 0 - 19.99Ω
Resolution: 0.01Ω
Accuracy: ± (5% of reading + 2 digits)
Fixed pass limits:
Lead ≤ 0.10 Ω = PASS
≤ 0.20 Ω = NOTE x.xx PASS
Class I ≤ 0.10 Ω = PASS
≤ 0.20 Ω = NOTE x.xx PASS

If NOTE x.xx Ω PASS is displayed, end user of HPAT should take note of the Earth Continuity resistance value and reach a pass/fail decision for the appliance.

INSULATION
User Selectable Voltage:
>500V DC at 1mA (<625V DC into open circuit)
>250V DC at 1mA (<312.5V DC into open circuit)
Test current: 1.5mA (into short circuit)
Ranges: 2.00MΩ, 20.0MΩ, 200MΩ
Resolution: 0.01MΩ
Accuracy: <100MΩ ± (5% reading + 2 digits)
>100MΩ ± (10% reading + 2 digits)
Fixed pass level:
Lead: ≥ 1.0 MΩ
Class I: ≥ 1.0 MΩ
Class II: ≥ 2.0 MΩ

MARTINDALE ELECTRIC

Specification
HPAT500
HandyPAT

FUSE CHECK
Test voltage: 4V DC (into open circuit)
Test current: 200mA DC (into short circuit)
Pass level: >2mA

GENERAL
Overload protection: 300V AC/DC
Protection class: IP20
Safety: Complies to BS EN 61010-1
Temperature Range: -10 to 40°C, non-condensing
Batteries: 6 x 1.2V AA NiMH rechargeable batteries 1800mAh, or greater
Caution - use only the battery type specified
Battery Life: Fully charged, minimum 600 complete tests. The HPAT500 will operate fully from the battery charger in the event of discharged batteries. Do not remove batteries.
Auto Power Down:
After 10 minutes of inactivity, or when battery low
Battery Charger:
Input: 230V 50Hz
Output: 12VDC at 300mA, 5.5 jack x 2.5 bore centre positive
Dimensions: 90 x 210 x 54mm
Weight: Approx 700g (including batteries & leads)

Check out what else you can get from Martindale:

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

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