

# KEWTECH



## Portable Appliance Tester KT73 OPERATOR'S MANUAL



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## 1.0 Introduction

Under the 1989 Electricity at Work Regulations employers are required to maintain the portable appliances in use on their premises. Your portable appliance tester (PAT) has been designed to help you carry out and record all the necessary tests required.

Your PAT is a dual voltage instrument which will self calibrate itself to either 230V or 110V 50 or 60Hz.

## 2.0 Safety

Your PAT has been designed to the requirements of EN 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use. This manual contains information and warnings which must be heeded to ensure user safety during operation. It is therefore important that this manual is read before proceeding with any tests.

Your PAT carries out a number of electrical tests which could be potentially hazardous to the user. These tests must be performed by suitably trained personnel.

To ensure repeatable accuracy, your PAT should be returned on a regular basis for calibration. If the PAT behaves abnormally (e.g. faulty display) do not use and contact your supplier for servicing. This instrument should be operated strictly in accordance with the instructions supplied. No liability is accepted for any losses as a result of misuse in the course of operation.

### WARNINGS

- ***There are no serviceable parts contained within you PAT and under no circumstances should you attempt any repair or modification.***
- ***Do not touch the appliance whilst carrying out insulation tests.***
- ***Ensure the earth clip is securely connected to the appliance during the earth bond test.***
- ***If in any doubt regarding the test requirements for the appliance always refer back to the manufacturer of the appliance under inspection/test.***
- ***To ensure continued correct operation, the PAT should be periodically calibrated.***
- ***Do not connect your PAT to the mains supply via the IEC lead connection.***

## 3.0 FEATURES

### 3.1 Dual Voltage Operation

The PAT will accept either a 110V or 230V, 50Hz or 60Hz mains input.

### 3.2 Fuse check

For situations where the integrity of an appliance's fuse is in doubt the PAT provides front panel 'Fuse Check' contacts. Simply touch the end caps of the fuse to be tested

onto the contacts. A buzzer will indicate whether there is continuity through the fuse. It is not therefore necessary to carry a continuity tester as well as the PAT.

### **3.3 Labels (optional)**

A comprehensive range of appliance labels are available for use in conjunction with the PAT.

## **4.0 Available Tests**

Listed are the range of tests which your PAT is capable of undertaking.

### **Earth Bond Test**

The earth bond test will verify that the protective earth point of connection to the appliance's chassis is sound. The test can be performed at 100mA, 10A or 25A depending on the type of equipment under test - e.g. 100mA for business equipment.

During the test the PAT applies a low voltage signal between the earth pin and the chassis of the appliance.

### **P-N Fuse Continuity**

The PAT will verify the fuse and lead continuity by applying a low voltage signal across the appliance's phase and neutral pins. The pass/fail point is set to a high resistance to allow continuity to be checked even if the appliance has electronic input circuits. This test must be conducted with the appliance switch in the ON position.

Appliances with a very high phase-neutral resistance may fail this test although they are not faulty. Such appliances include those with electronically controlled on/off switches (e.g. some types of drill), appliances with a high inductance (since the test is conducted with a low ac voltage) and low power soldering irons. For these appliances the fuse test is not appropriate and should be omitted. The fuse continuity may be checked by powering the appliance during a run test.

Note: The purpose of the fuse test is to check that the fuse is not blown or phase/neutral conductors are not open circuit as this may not be evident from a visual inspection.

This test will also verify the polarity of the Phase Neutral connections of an IEC lead or extension lead are correct.

### **Insulation**

The insulation test will establish the value of the appliance's insulation resistance. Normally the insulation test is conducted at 500V d.c. which is applied between the appliance's phase & neutral pins and earth pin for class I appliances and between phase & neutral pins and the PAT earth clip for class II appliances.

For sensitive appliances that may be damaged by a 500V insulation test the PAT provides an additional test voltage of 250V d.c.

Suggested tests and pass level thresholds are as follows:-

### **Class 1 appliances**

Visual check	Appliance in good condition
25A earth bond test	0.10 ohm
P-N Fuse continuity test	39 kohm approx.
Insulation test 500V	1 Mohm

### **Class 1 appliances (Business equipment)**

Visual check	Appliance in good condition
100mA earth bond test	0.10 ohm
P-N Fuse continuity test	39 kohm approx.
Insulation test	1 Mohm

### **Class 2 appliances**

Visual check	Appliance in good condition
P-N Fuse continuity test	39 kohm approx.
Insulation test	2 Mohm

### **IEC Lead Test**

Visual check	Lead in good condition
25A earth bond test	0.10 ohm
P-N continuity/polarity test	39 kohm approx.
Insulation test	2 Mohm

### **Extension Lead Test**

**(Use an IEC lead to connect from an extension lead outlet socket to the PAT IEC test socket)**

Visual check	Lead in good condition
25A earth bond test	0.50 ohm
P-N continuity/polarity test	39 kohm approx.
Insulation test	2 Mohm

For appliances with high impedance P-N circuits the P-N continuity test can be omitted.

If in doubt check with the manufacturer of the appliance to determine the test conditions and recommended pass levels.

## **5.0 How to use the PAT**

### **5.1 Power Up**

Using the mains input lead connect the PAT to either a 110V or 230Va.c. supply. On power up the PAT will go through a self check procedure and automatically calibrate itself to the input voltage.

If an alternative Earth Bond lead has been nulled when the tester was last used you will also be asked if you wish to revert to use of the calibrated value of the Earth Bond lead supplied with the unit (by pressing GO) or retain the null value of the alternative lead (by pressing any other key).

## 5.2 Using the Keypad

All of the PAT's functions are accessed using the keypad.

The key functions are as follows:

SELECT TEST	Press either the down key to step through the available tests, or the up key to go back a step.
PASS LEVEL	Select the pass level for a test.
GO	Carry out the test shown on the display.

Pressing the SELECT TEST keys during a test will terminate that test.

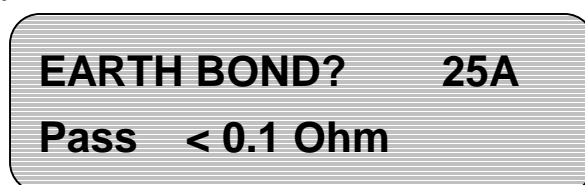
## 5.3 Testing.

Connect the appliance to the relevant socket on the PAT's front panel.

The tests required to check the safety of an appliance are presented in sequence. For any test select the required pass level then press GO to carry out the test. At the end of the test the result together with a pass fail indication will be displayed for a short period. The display will then revert to the initial test display to allow another test to be carried out if required. Pressing any key while the test result is being displayed will terminate the result display.

The test screen displays are as follows-

*PAT display*



For Class I appliances a high current protective earth test between the earth pin of the appliances mains plug and the PAT's Earth Bond clip.

*PAT display*

**EARTH BOND? 10A**  
**Pass < 0.1 Ohm**

For Class I appliances fitted with 3 or 5 amp fuses, a lower current protective earth test.

*PAT display*

**EARTH BOND? 100mA**  
**Pass < 0.1 Ohm**

For Class I Business Equipment where higher currents may damage the appliance under test.

*PAT display*

**FUSE TEST?**

For testing the P-N continuity of the appliance to check the integrity of the fuse and also to check that the appliance is switched on ready for the insulation test.

*PAT display*

**INSULATION? 500V**  
**Pass > 2.0 MOhm**

For testing the insulation resistance of the appliance between PN and the appliances earth pin for Class I appliances or between PN and the PAT's Earth Bond clip for Class II appliances.

*PAT display*

**INSULATION? 250V**  
**Pass > 2.0 MOhm**

Provides an insulation test at a lower test voltage than the previous test for use where there is a danger that the higher voltage may damage the appliance.

*PAT display*

**Earth Bond Null?**

The PAT is supplied with the Earth Bond lead with which it was calibrated. This 'Null' function allows extended earth bond test leads to be used for non standard appliances. The resistance of the extended lead can be 'nulled out' from the earth bond measurement.

When power is applied to the PAT the user is given the option to revert to the calibrated Earth Bond lead setting.

It should be noted that the Earth Bond test current will be reduced by the increased resistance of any extended lead.

To null an extended lead connect the new lead between the Earth Bond lead 4mm socket on the tester front panel and the 'Null' terminal. Then press the GO key.

NOTE – All appliances should be disconnected from the tester 110V, 230V and IEC lead test sockets to ensure the validity of the null measurement.

## **5.4 IEC Lead Test**

To test an IEC lead, plug the IEC lead's male and female connectors into the plug and socket arrangement on the PAT's front panel. Then carry out the tests required.

Extension leads can also be tested using the IEC test facilities of the PAT. Use an IEC lead to connect from a socket outlet on the extension lead under test to the IEC lead test connector on the PAT front panel.

**WARNING - NEVER CONNECT THE PAT TO THE MAINS VIA THE IEC LEAD TEST SOCKET.**

## Specification

### Earth Bond

Open circuit voltage	8V rms nom.
Current into 0.10 ohms	25A or 10A
Displayed values	0.00 to 1.99 Ohm, >2 Ohm
Accuracy	5% rdg $\pm 2$ digits, >1 Ohm 10% $\pm 2$ digits
Pass/Fail thresholds	0.1 to 0.9 Ohm (0.1 Ohm steps) , 2 Ohm
Test time	5s

### Earth Bond – IT Equipment

Open circuit voltage	100mV nom.
Current into short circuit	100mA
Displayed values	0.00 to 1.99 Ohm, >2 Ohm
Accuracy	5% rdg $\pm 2$ digits, >1 Ohm 10% $\pm 2$ digits
Pass/Fail thresholds	0.1 to 0.9 Ohm (in 0.1 Ohm steps), >2 Ohm
Test time	5s

### Lead/Fuse Continuity

Open circuit voltage	8V rms nom.
Displayed values	PASS/FAIL
Pass/Fail threshold	39kOhm approx.
Test time	5s

### PN-E Insulation

Test voltage into 0.5MOhm	250V or 500V dc (into 0.5Mohm load)
Displayed values	0.1 to 19.9 MOhm, >20 MOhm
Accuracy	500V - 5% rdg $\pm 2$ digits, >10MOhms 10% $\pm 2$ digits
Pass/Fail thresholds	0.2, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, MOhm
Test time	10s

All values given are defined at nominal mains input.

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