USER GUIDE

PAT250SX

Portable Appliance Tester

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For Patent information about this instrument refer to the following web site:
megger.com/patents

This manual supersedes all previous issues of this manual.

Please ensure that you are using the most recent issue of this document.

Destroy any copies that are of an older issue.

Declaration of Conformity

Hereby, Megger Instruments Limited declares that radio equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directive 2014/53/EU.
Other equipment manufactured by Megger Instruments Limited described in this user guide is in compliance with Directives 2014/30/EU and 2014/35/EU where they apply.

The full text of Megger Instruments EU declarations of conformity are available at:

megger.com/eu-dofc

Contents

1. Introduction

Thank you for purchasing the PAT 250SX. The PAT 250 series are supplied with a 1 year licence for CertSuite PAT software. CertSuite PAT can be used for custom test sequences, to control the PAT 250SX and to produce test reports. Please visit **megger.com** to set up your CertSuite PAT account. The first time you connect your PAT250 to CertSuite, a 1-year licence will automatically be added to your account.

The PAT250SX is a battery operated Bluetooth® (BLE) portable appliance tester that can carry out basic safety tests on electrical appliances fitted with a standard mains plug. The unit can be used in 2 modes

- Testing using a mobile device with Bluetooth®, such as a tablet that has CertSuite PAT loaded on it connected to the PAT250SX via Bluetooth
- Testing using the PAT250SX and its integral function buttons

This user guide will describe how to connect the PAT250SX to a mobile device for testing using CertSuite PAT and how to carry out tests just using the PAT250SX without connection to CertSuite PAT.

Read the ensuing safety regulations attentively before using this device.

1.1 Company web site

Occasionally an information bulletin may be issued via the Megger web site. This may concern new accessories, new usage instructions or a software update. Please occasionally check on the Megger web site for anything applicable to your Megger instruments.

www.megger.com

1.2 UNPACKING THE CARTON

Unpack the carton contents carefully. There are important documents that you should read and keep for future reference.

Please register your product via this link in order to benefit from technical support.

www.megger.com/register

2. Safety Warnings and Standards

These safety warnings must be read and understood before the instrument is used. Retain for future reference. They must be observed during use.

National Health and Safety Legislation requires users of this equipment and their employers to carry out valid risk assessments of all electrical work so as to identify potential sources of danger and risk of electrical injury such as inadvertent short circuits.

2.1 Warnings, Cautions and Notes

This user guide follows the internationally recognised definition.

Description
WARNING : Indicates a potentially dangerous situation which, if ignored, could lead to death, serious injury or health problems.
CAUTION : Indicates a situation which could lead to damage of the equipment or environment
NOTE : Indicates important instructions to be followed to perform the relevant process safely and efficiently.

2.2 Safety warnings

- The instrument must be operated only by suitably trained and competent persons.
- Only use test leads and accessories supplied or approved by Megger.
- At any time the ⚠ symbol or ⚠ symbol is displayed, the user guide and warnings documentation must be consulted to identify the nature of the hazard and any actions necessary to avoid the hazard.
- Do not use the instrument if there are any signs of damage.
- All test leads, probes and clips must be in good order, clean and with no broken or cracked insulation.
- Probes and clips should be held behind the finger guard.
- Test leads not used during a measurement should be disconnected from the Appliance tester.
- During testing, ensure no hazard will exist as a result of normal running or under fault conditions.
- During testing the unit under test (appliance) should not be touched, other than using the appropriate accessories, as faulty appliances can present a shock hazard.
- Do not touch the exposed parts of test leads during tests as hazardous voltages may be present.
- Do not connect test leads to live systems or hazardous voltages.
- Do not touch the IEC extension lead socket pins especially during a test, as hazardous voltages may be present due to a potentially faulty appliance.
- Do not touch the exposed earth pins of the 230 V test socket during a test, as voltages may be present due to a potentially faulty appliance.
- Replacement fuses must be of the correct rating and type. **See 12. Battery and Fuse replacement on page 34.**
- If this instrument is used in a manner not specified in the supplied documentation, the protection provided by the instrument may be compromised.
- For safety, only connect the PAT to a supply that is properly earthed. If in doubt, the supply should be checked by a qualified electrician.
- Perform a mains powered leakage test only after the Earth bond and insulation tests have been completed, as this test operates at mains voltage.
- During mains powered leakage tests the appliance under test will operate. Make sure the appliance is safely secured to ensure no damage or danger is possible.
- A yearly calibration is recommended with interim checks on measurement accuracy to ensure no equipment can be left in a hazardous live condition through incorrect readings.
- Use only the Megger approved PAT150 or PAT250 charger. Other chargers may present a fire risk.
- Do not connect the battery charger to the PAT250 whilst running a test.
- During testing make sure that the shutter covers the battery charger port. There is a risk of electrocution from exposed terminals. Do not touch any exposed terminals or probe tips during test.
- Always remove the mains plug test lead  from the mains supply AND from the instrument when not in use.

2.2.1 PAT250SX Wireless Control Safety

- When the PAT250SX is under wireless control pay attention to the warnings displayed on the wireless-control device.
- Keep the PAT250SX and the appliance under test in sight and within reach all the time during the test. Be aware that some tests need to switch on the appliance under test. Make sure that it is safe for the appliance to operate before initiating these tests.
- Note that a wireless-control test may be aborted by pressing the red power button on the PAT250SX.

2.2.2 Installation category definitions:

Measurement equipment may be safely connected to circuits at the marked rating or lower. The connection rating is that of the lowest rated component in the measurement circuit.

CAT IV - Measurement category IV: Equipment connected between the origin of the low-voltage mains supply and distribution panel.

CAT III -Measurement category III: Equipment connected between the distribution panel and electrical outlets.

CAT II - Measurement category II: Equipment connected between the electrical outlets and user's equipment.

The PAT250SX is rated CAT II 300 V

Ensure the equipment under test is properly secured and in a safe condition prior to running a 230 V AC leakage test

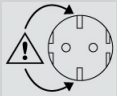
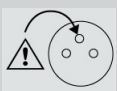
2.2.3 Product Safety Category

CAT II 300 V - MEASUREMENT CATEGORY II equipment connected between the electrical outlets and the user's equipment.

⚠ 230 V AC powered Leakage testing: Connecting the PAT250SX to a 230 V AC supply will automatically switch the leakage tests from a 40 V AC test to a mains powered 230 V AC test. Any leakage testing performed with 230 V AC connected will operate the equipment under test.

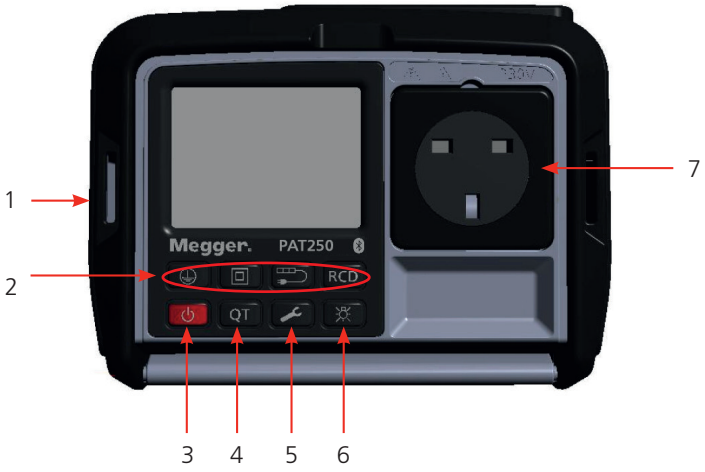
2.3 Safety, Hazard and Warning symbols on the instrument

This paragraph details the various safety and hazard icons on the instrument's outer case.

Icon	Description
	Danger: Mains voltage present during testing.
	Caution: Refer to user guide.
	UK conformity. This equipment complies with current UK legislation.
	EU conformity. Equipment complies with current EU directives.
	Equipment complies with current 'C tick' requirements.
	Do not dispose of in the normal waste stream.
	Caution: Earth pins of the 230 V test socket will become hazardous if test lead P1 is in contact with hazardous voltages during continuity test.
	Fuse failure.
	Battery type fitted.
	Do not connect to 230 V supply.
	Caution: Earth pin of the 230 V test socket will become hazardous if test lead P1 is in contact with hazardous voltages during continuity test.

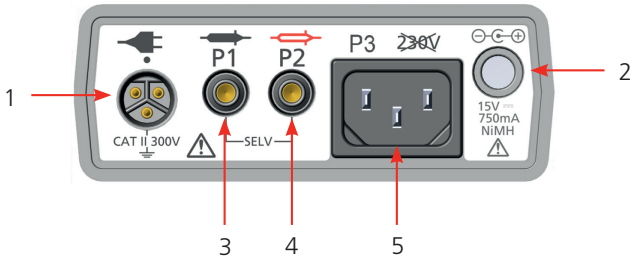
3. Instrument Overview

3.1 Instrument layout PAT250



Item	Description	Item	Description
1	Neck strap slot	4	Quick test
2	Test groups	5	Setup
3	Power ON – Hold for >0.5s	6	Backlight
		7	Main test socket

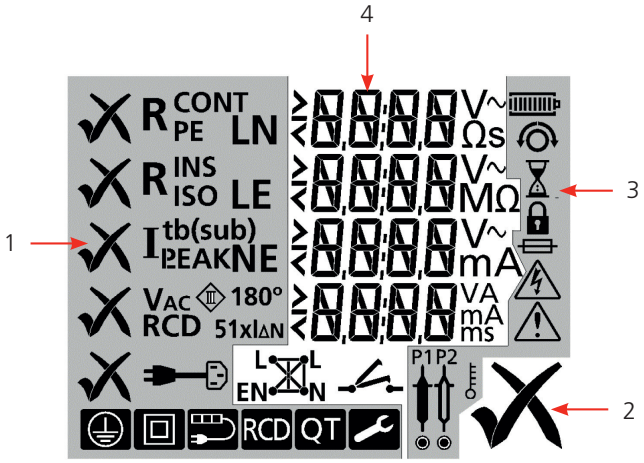
3.2 Instrument connector layout



Item	Description	Item	Description
1	Mains I/P Used for testing that require mains power to be applied to the equipment under test, such as: - PRCD testing - Mains powered earth leakage tests	3	P1 Continuity (Bond), Insulation and Touch leakage probe connection
2	Battery charging socket	4	P2 Used with P1 for testing Separated Extra Low Voltages and Mains voltages
		5	P3 IEC power cord and extension lead adaptor socket. Do NOT connect to 230 V AC

WARNING : Do NOT connect P1, P2 and P3 sockets to hazardous live voltages

3.3 Display layout



Item	Description	Item	Description
1	Test information	3	Information/warnings
2	Overall PASS/FAIL	4	Test results

3.4 Measurement display symbols

R^{CONT}_{PE}	Continuity of the protective earth conductor		Test in progress
R^{INS}_{ISO}	Insulation resistance between the Live/Neutral conductors and earth		Measurement locked ON
I_{EA}	Alternative method:- 40 V AC leakage test for protective conductor current and touch current. Battery powered test		Notice: Refer to user guide
		Ω	Resistance in ohms
$I^{(sub)}_{LEAK}$	(English language models) Alternative method:- 40 V AC leakage test for protective conductor current. Battery powered test	MΩ	Insulation resistance in Meg Ohms (ohms x $1x10^6$)
		mA	Leakage current in milliamps
$I^{t\ (sub)}$	(English language models) Alternative method:- 40 V AC leakage test for touch current. Battery powered test	L N	Cable polarity correct
	Power lead or Extension lead polarity test	L N	Live to Neutral cross polarity
P1	Test probe P1 to be connected	L N	Live to Neutral short circuit detected
✓	Test or overall test group passed	L E	Live to Earth short circuit detected
✗	Test or overall test group failed	L N	Open circuit detected
	Fuse failed		General warning - Appliance open circuit or not switched on*

RCD	Residual current device test mode	P2	Test Probe P2 to be connected
0˚ **180˚**	0 ° - Positive edge test current 180 ° - Negative edge test current		Instrument hot, allow to cool
1xIΔN	1 x IΔn = the rated operating current of the RCD		Lead null active
5xIΔN	5 x IΔn = 5 time the rated operating current of the RCD		Warning: Hazardous voltages present
V~	Volts AC		P1 test lead null set
s	Seconds		Extension lead adaptor lead null set
ms	Thousandths of a second	**I_{PE}** **I_{LEAK}**	Earth leakage current measured using the differential/residual method
	RCD – Press TEST or RESET	**LN**	Phase to Neutral voltage
I_B^t	Touch current measured with P1 test probe using the direct method	**NE**	Neutral to Earth Voltage
LE	Phase to Earth voltage	**VAC**	Separated Extra-Low Voltage measurement
VAC	Volts AC (measurement function)	R^{CONT}	(English language models) Fixed installation equipment continuity test
	Repeat continuity test	R_{PE}	Fixed installation equipment continuity test

NOTE : *The PAT250SX range performs various pre-checks prior to testing to ensure the asset is not short-circuit and is switched on.

3.5 Instrument Buttons

The Class 1, Class 2, Extension lead and RCD buttons will launch test sequences for those appliance types.

Power button - Hold down for 0.5 second to switch on,
- Hold down for 2 seconds to switch off

Abort button - press to stop test or exit a setup mode

QT — Quick test button

Class 1 button

RCD — RCD test button

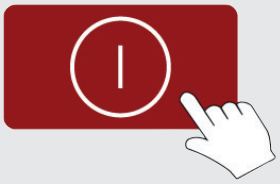
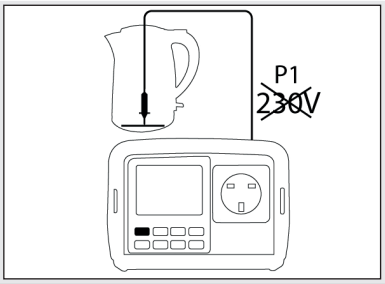
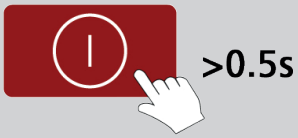
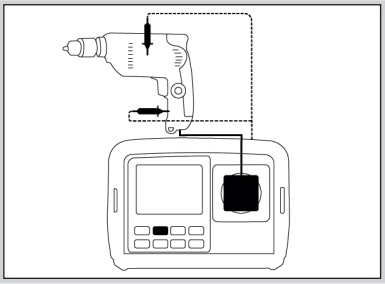
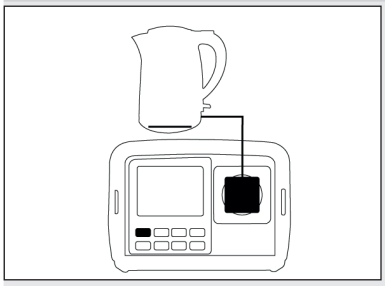
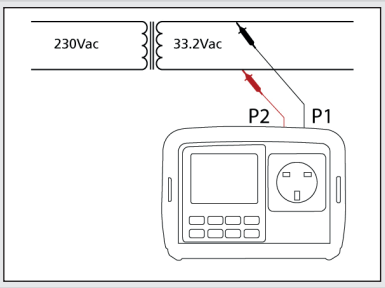
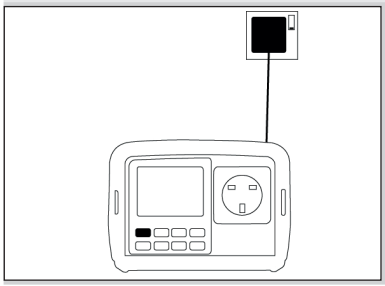
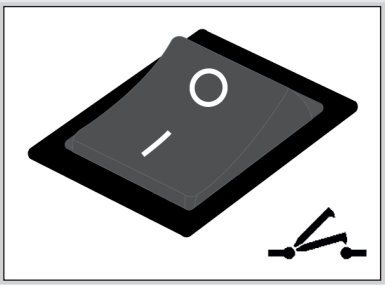
Class 2 button

Setup button – allows access to PASS limits, test times and lead null option

Extension lead button

Backlight button

3.6 User guide INSTRUCTION symbols

	Press the button		Connect the P1 test lead to socket P1 on the PAT250SX and the probe to exposed metalwork Ensure the probe is NOT connected to a 230 V source.
	Press and hold for greater than 0.5 seconds		Connect the P1 test lead to different conductive points on the equipment under test during the measurement
	Connect the equipment to be tested to the instrument		Connect both the P1 and P2 test leads to the circuit to be measured
	Connect the Instrument to the mains supply using the mains plug test lead (for mains powered leakage and RCD testing)		Ensure equipment under test is switched ON

3.7 Carry strap fitting and removal

Fitting the carry strap:

Removing the carry strap:

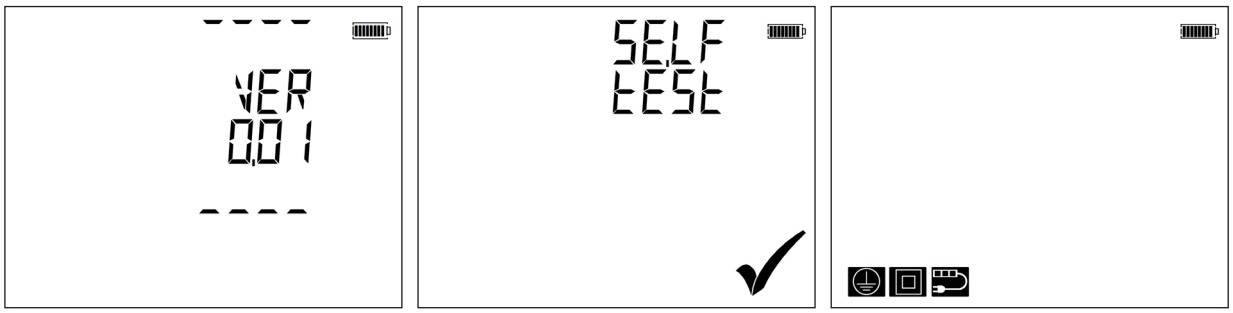
4. Power button functions

The power button has many functions outlined below.

4.1 Switching ON

Press and hold the power button  >0.5 s

Power the PAT250 before connecting any test appliances. The PAT 250 will perform a series of self checks and then be ready for testing.



4.2 Switching OFF

4.2.1 Manual OFF

Press and hold the power button  >2 s

4.2.2 Auto OFF

Unit switches after 3 minutes of inactivity (not adjustable)

4.3 Abort a test

A test can be aborted at any time by pressing the Power button

4.4 ESC/Return

The power button can be pressed to return to a previous screen or to escape from a setting adjustment.

4.5 Save

When settings have been changed, press the power button to save the changes.

5. Testing using CertSuite PAT

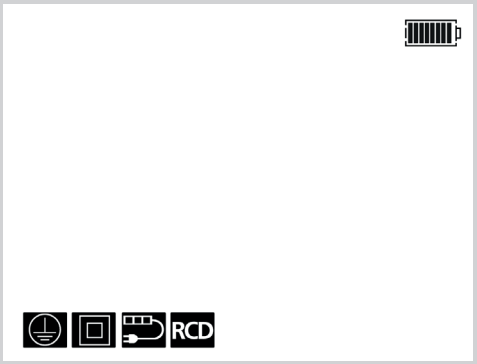
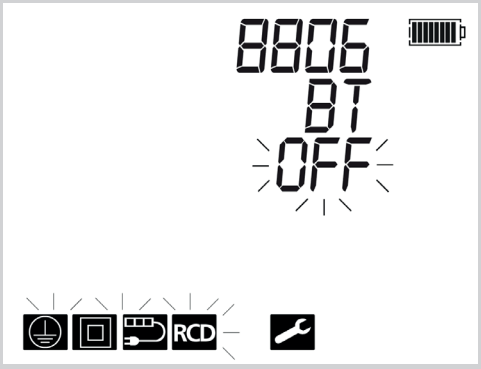
CertSuite PAT performs two functions:

- it will launch automatic tests from the mobile device using pre-loaded or user customised test groups.
- it records the results of the testing. In this mode, tests cannot be launched from the PAT250SX function buttons.

The PAT250SX must be connected to a Bluetooth® enabled mobile device that has CertSuite PAT installed.

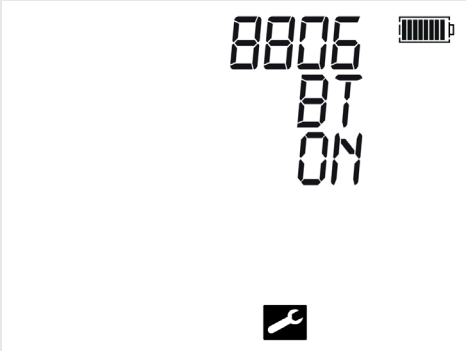
Scan the QR code to download CertSuite PAT to your mobile device or visit **megger.com** to access on a PC or Mac:

The basic procedure is as follows:

Power on	
Press the power button for 0.5s to switch the PAT250SX on. After the self test the unit will show the default screen	
Enter Setup	
Press the setup button [ ] to enter setup mode on the PAT250SX. The test icons and OFF will flash. The PAT250SX will show a unique number (in this example "8806") and the default will show bluetooth off **BT off**. **NOTE :** In the PAT250SX setup mode, the field that can be altered is the one that is flashing.	
Activate Bluetooth On/Off - Press setup button [ ]	
Pressing the setup button a second time will activate the bluetooth on/off function. Bluetooth will be on indicated by the **ON** flashing. The PAT250SX is searching for a CertSuite to connect to **NOTE :** you can exit the setup mode at any time by pressing the red button.	

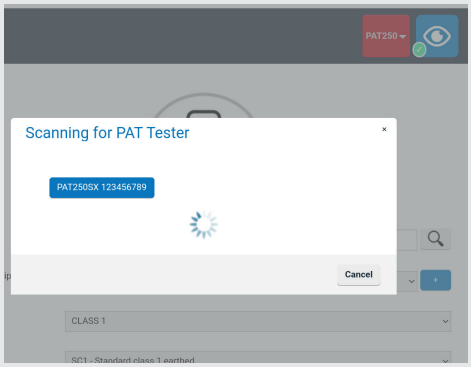
While **OFF** is flashing it can be changed. Press the setup button to change this to **ON**. The display will change to indicate Bluetooth is on **BT on**.

The PAT250SX is now sending a bluetooth signal.

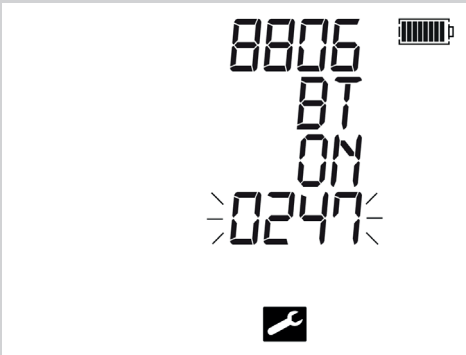


CertSuite PAT

Go to CertSuite and open a PAT test and click the red 'PAT' button. This triggers CertSuite to search for a PAT250.



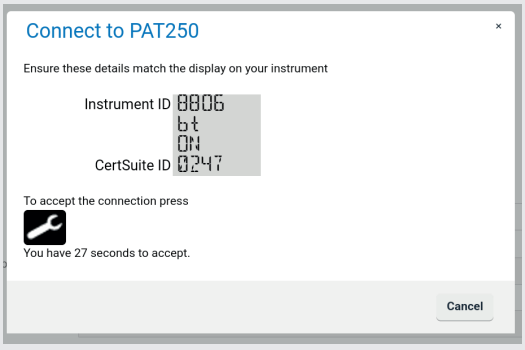
Since the PAT250SX is now sharing its bluetooth signal, CertSuite PAT should receive the PAT250SX unique number to complete the pairing process (**8806** in this example).



CertSuite will show a message on screen confirming the PAT250SX unique number (**8806** in this example).

CertSuite will also have its own unique connection number (**0247** in this example).

When this screen appears press the setup button [ ] to accept the CertSuite connection, if the unique connection numbers match on both PAT250SX and CertSuite. The **0247** number will stop flashing. This means that both the instrument and CertSuite PAT have accepted the connection, a two step process for added security.

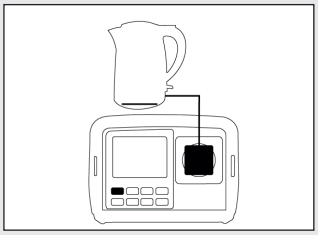
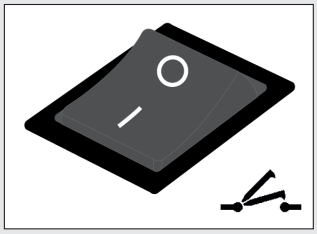
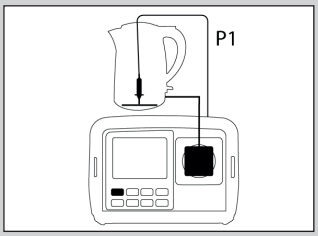
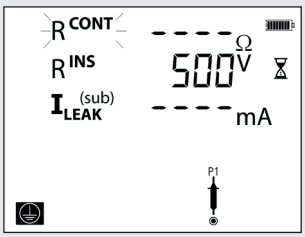
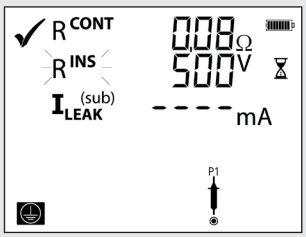
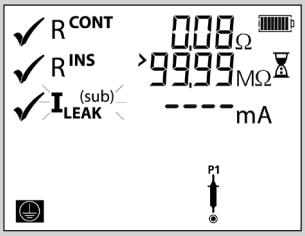
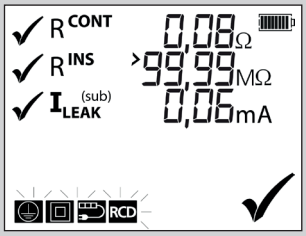


Follow the instruction on the CertSuite PAT app to select tests, perform testing, log results and produce test reports.

For more information on CertSuite PAT visit megger.com or scan the QR code

6. Testing using the PAT250SX

6.1 Class 1 test using substitute leakage @ 40 V AC $I_{LEAK}^{(sub)}$

1. Plug the appliance under test into the PAT		2. Turn on the appliance under test	
3. Connect BOND lead P1 to a metal point on the appliance		4. Select required voltage	Class 1 @ 500 V  OR Class 1 @ 250 V for IT equipment  >2 s
5. Ensure probe (P1) is connected		6. Remove probe (P1)	
7.		8. Class 1 Pass	

NOTE : If the contact symbol is displayed during the test, the PAT has detected an open circuit load. Ensure the appliance is switched on then press the Class 1 icon

NOTE : The PAT250SX performs various pre-checks prior to testing to ensure the asset is not short-circuit and is switched on.

6.2 To repeat a continuity test (Class 1 and Extension lead tests only $R^{CONT}_{\circ}$ or $R_{PE\,\circ}$)

Press QT key during R^{CONT} (or R_{PE}) test to enable repeat test. The ↻ symbol will be displayed.

When the timer symbol has disappeared and the repeat symbol is flashing, press QT to run repeat test

Press ⏚ to exit repeat test.

6.3 To repeat continuity test with 1.0 Ω limit (NOT available on UK models)

At the end of a FAILED continuity test the ↻ symbol will flash for up to 5 seconds.

Press the ⏚ or ⌁ button to repeat the test within the 5 seconds.

The test will be repeated with a 1.0 Ω pass limit.

6.4 Lock a test in the ON state:

R^{CONT} (R_{PE}) or R^{INS} (R_{ISO}) can be locked ON (🔒) during a test for up to 3 minutes. To Lock R^{CONT} (R_{PE}) or R^{INS} (R_{ISO}) on:

Press ⏚, ⧈ or ⌁ during the R^{CONT} (R_{PE}) or R^{INS} (R_{ISO}) test

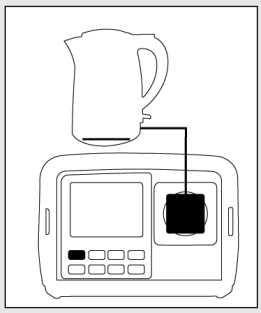
Press key again to unlock test and proceed to next test

NOTE : This feature is available in group test and QT mode.

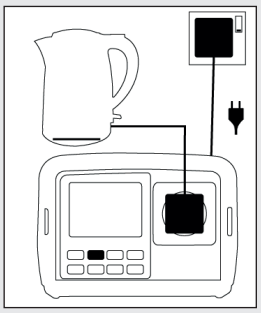
6.5 Class 1 test using mains voltage leakage @ 230 V AC

Mains powered testing of equipment with an Earth return conductor

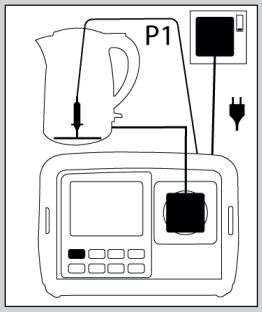
1. Plug the appliance under test into the PAT



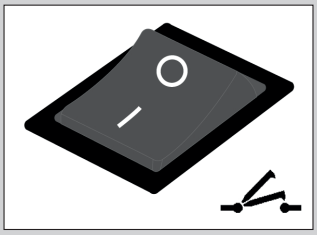
2. Plug the PAT tester into a power supply



3. Connect BOND lead P1 to a metal point on the appliance



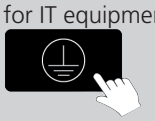
4. Turn on the appliance under test



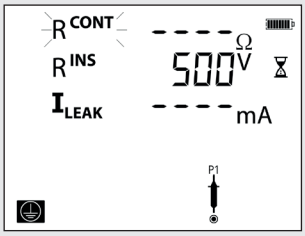
5. Select required voltage

Class 1 @ 500 V

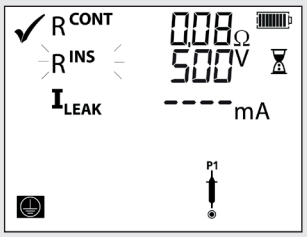
OR Class 1 @ 250 V for IT equipment



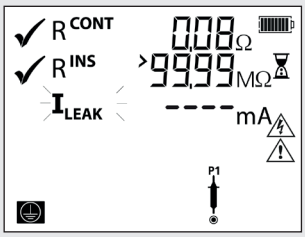
6. Ensure probe P1 connected



7. See note 1



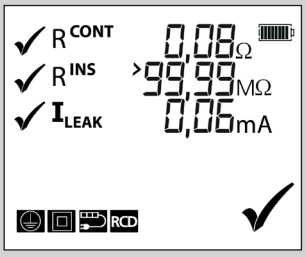
8. See notes 1, 2 and 3 below



9. Warning: Appliance will operate. If the appears, check appliance is switched on and press .

Before the test starts the and will flash warning that the appliance will operate, press the to proceed.

10. Class 1 Pass



NOTE : 1: If the contact symbol appears, the appliance needs to be switched ON.
The PAT250SX performs various pre-checks prior to testing to ensure the asset is not short-circuit and is switched on

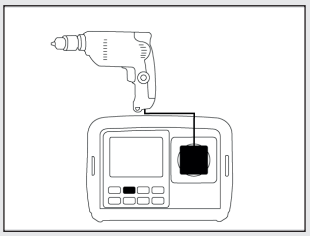
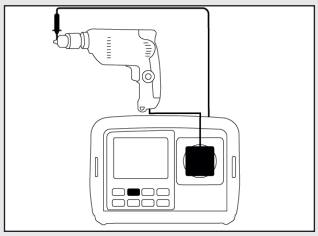
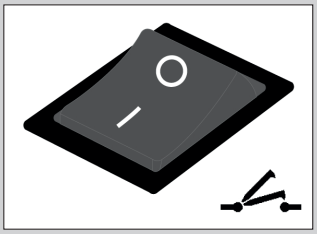
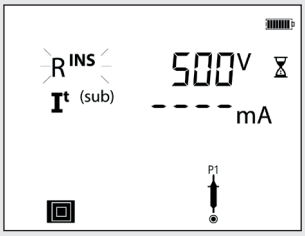
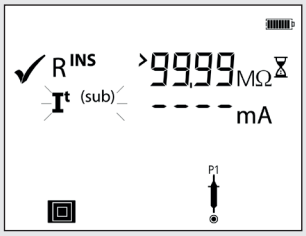
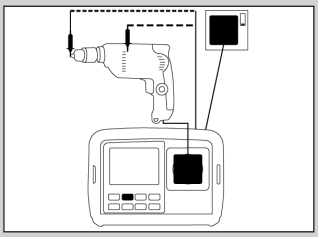
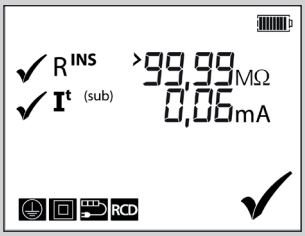
NOTE : 2: If the L to N short circuit symbol shows, user must check whether there is a true short circuit. Press Class 1 button to proceed but there is a risk of damage or tripping of protective devices. If the L-N or L-E symbol is flashing a low resistance has been detected. An L-E fault will stop the test. See Measurement symbols table. An L-N fault could damage the PAT tester and should be investigated. To override an L-N warning, press the Class 1 button.

NOTE : 3 : Faulty equipment may cause an RCD to trip during a Touch leakage test

WARNING : High inertia appliances (e.g. angle grinders) may present a hazard whilst running. It is recommended that where a hazard is likely, the battery powered "Substitute leakage" test is used, which will not operate the appliance

6.6 Class 2 test ⧈ using substitute leakage @ 40 V AC

Battery powered testing of equipment without an Earth return conductor

1. Plug the appliance under test into the PAT tester		2. Connect BOND lead P1 to a metal point on the appliance	
3. Turn on the appliance under test		4. Select required voltage	Insulation test @ 500 V  OR Insulation test @ 250 V  >2 s
5. Ensure probe (P1) is connected		6. See note below	
7. Repeat contact on all exposed conductive parts. **See 6.4 Lock a test in the ON state: on page 17.**		8. Class 2 Pass	

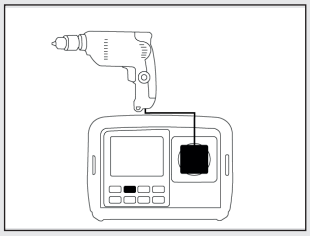
NOTE : If the contact symbol appears, the appliance needs to be switched ON

NOTE : The PAT250SX performs various pre-checks prior to testing to ensure the asset is not short-circuit and is switched on

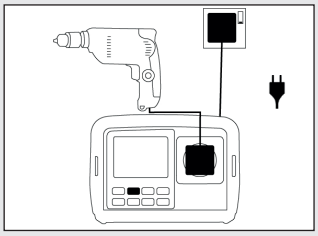
6.7 Class 2 test ⧈ using mains voltage leakage @ 230 V AC

Mains powered testing of equipment without an Earth return conductor

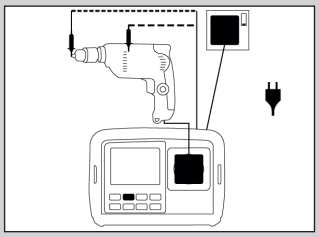
1. Plug the appliance under test into the PAT tester



2. Plug the PAT tester into a power supply



3. Connect BOND lead P1 to a metal point on the appliance

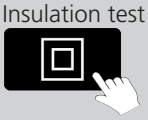


4. Select required voltage

Insulation test @ 500 V

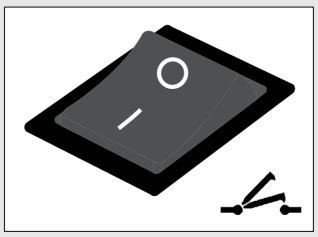
OR

Insulation test @250 V

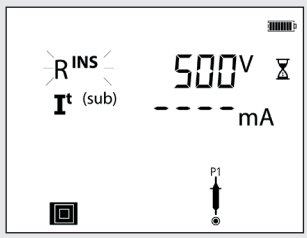


>2 s

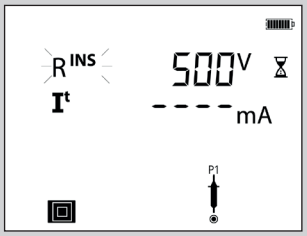
5. Turn on the appliance under test



6. Ensure probe (P1) is connected



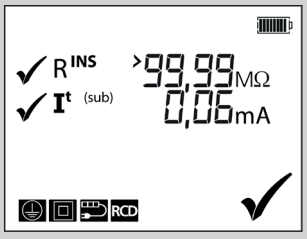
7. If the L to N short circuit symbol shows, user must check whether there is a true short circuit. Press Class 2 button to proceed but there is a risk of damage or tripping of protective devices.



8.

WARNING : Appliance will operate! if the ⏚ appears, check appliance is switched on and press ⏚.
Before the test starts the ⚠ and ⚡ will flash warning that the appliance with operate, press the ⏚ to proceed.

9. Class 2 Pass



NOTE : High touch leakage measurement on faulty equipment can trip the supply RCD

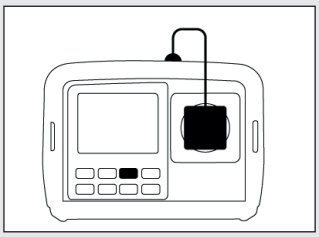
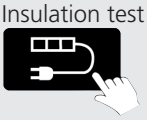
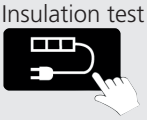
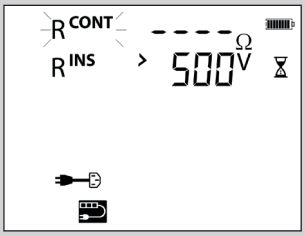
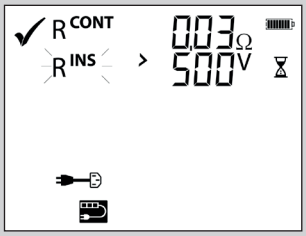
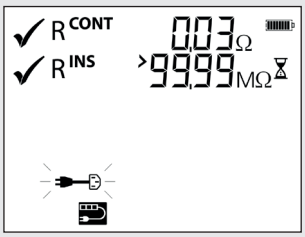
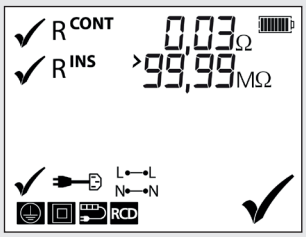
NOTE : 1: If the contact symbol ⏚ appears, the appliance needs to be switched ON.
The PAT250SX performs various pre-checks prior to testing to ensure the asset is not short-circuit and is switched on

NOTE : 2: If the L-N or L-E symbol is flashing a low resistance has been detected. An L-E fault will stop the test. See Measurement symbols table. An L-N fault could damage the PAT tester and should be investigated.
To override an L-N warning, press the Class 1 button.

WARNING : High inertia appliances (e.g. angle grinders) may present a hazard whilst running. It is recommended that where a hazard is likely, the battery powered "Substitute leakage" test is used, which will not operate the appliance

6.8 Power cord test

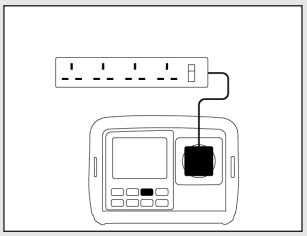
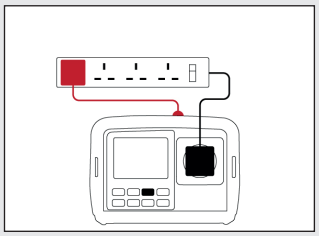
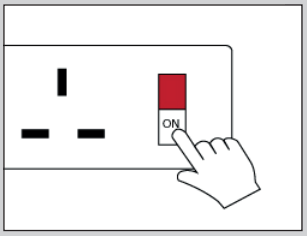
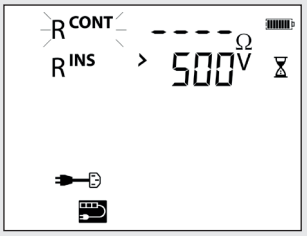
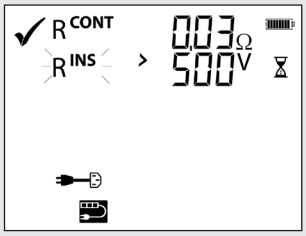
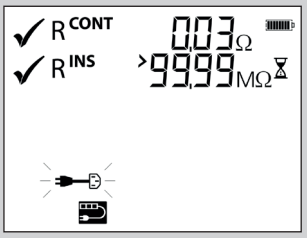
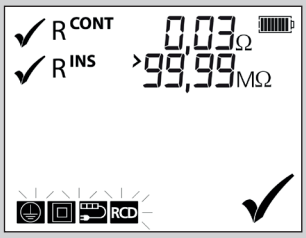
Testing a standard power cord

1.		2. Select required voltage	Insulation test @ 500 V  OR Insulation test @ 250 V  >2 s
3.		4.	
5.		6.	

NOTE : For power cords longer than 5m the test can be re-run with a 1.0 Ω pass limit by pressing the test button within 5 seconds of the continuity test failing.
See 6.3 To repeat continuity test with 1.0 Ω limit (NOT available on UK models) on page 17.

6.9 Extension lead test

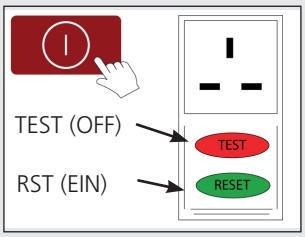
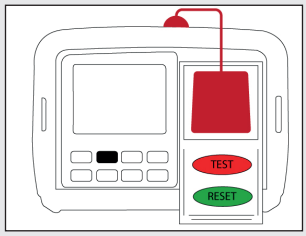
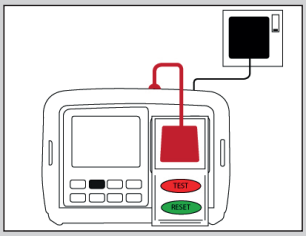
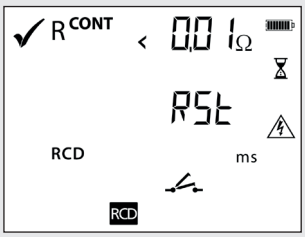
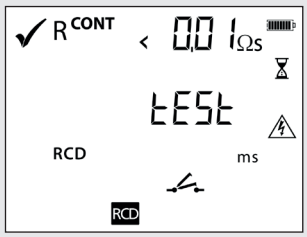
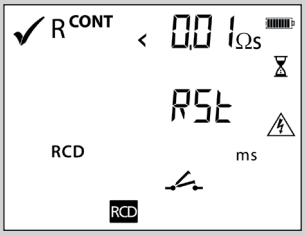
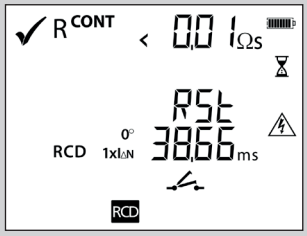
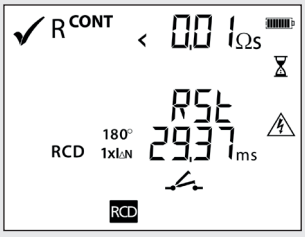
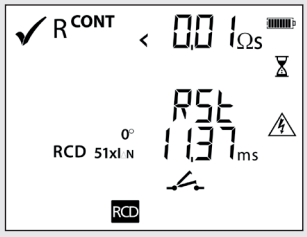
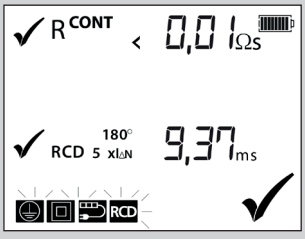
Testing an extension lead or multi-way extension lead

1.		2.	
3.		4.	Insulation test @ 500 V  OR Insulation test @ 250 V  >2 s
5.		6.	
7.		8.	

NOTE : Multiple earth continuity tests can be carried out by pressing the QT button during the continuity test, and pressing it again for each new continuity test. **See 6.2 To repeat a continuity test (Class 1 and Extension lead tests only $R^{CONT}_{\circ}$ or $R_{PE\circ}$) on page 17.**

6.10 Portable RCD test RCD

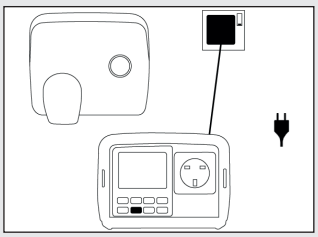
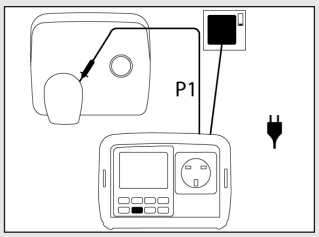
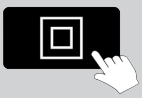
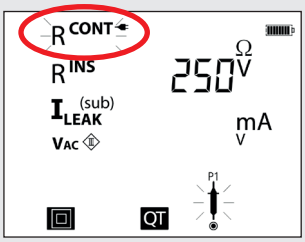
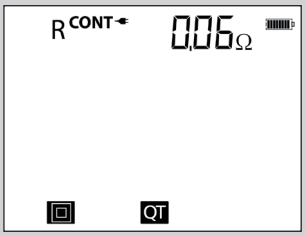
Testing a portable RCD or extension lead with built-in RCD

1. The **TEST** and **RESET** buttons will need to be pressed on the RCD during this test.		2. Connect RCD	
3.		4. See note below	30 mA RCD RCD OR 10 mA RCD RCD >2 s
5. Press **RESET** on RCD		6. Press **TEST** button on RCD	
7. Press **RESET** on RCD		8. Press **RESET** on RCD	
9. Press **RESET** on RCD		10. Press **RESET** on RCD	
11. Test complete			

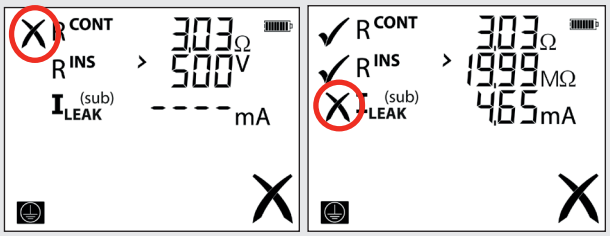
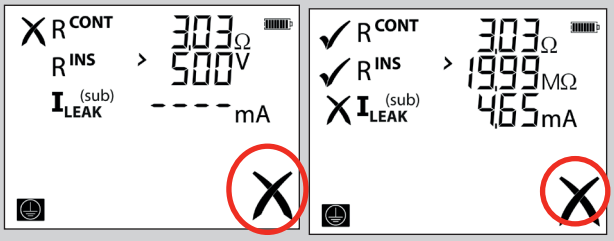
NOTE : The PAT250SX defaults to 30 mA RCD. To change to 10 mA, hold the RCD button down for more than 2 seconds then release.

6.11 Fixed equipment testing

Only a continuity test is possible when testing fixed equipment without disconnecting the incoming supply. Use the Quick Test (QT) button to access the continuity test mode:

1.		2. Ensure probe (P1) is connected	
3.		4. Press 5 times to display R CONT	 x 5
5. Continuity test		6.	
7. Test complete			

6.12 Fail Handling

1. Individual test fail indicated by a small cross:	
2. Overall FAIL indicated by a large cross:	

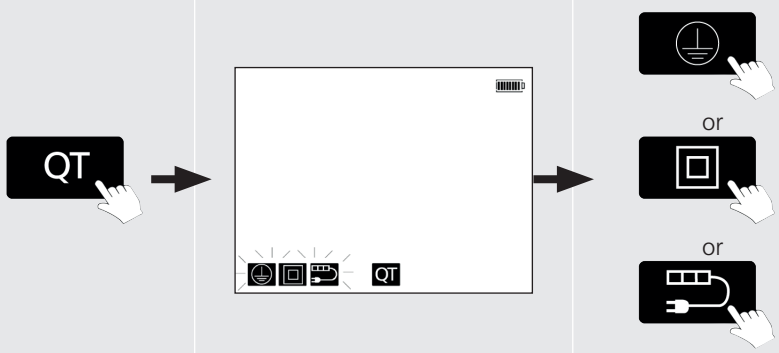
NOTE : Once an appliance has failed a test, further testing of the test group sequence is prevented for safety reasons, except for the extension lead testing

6.13 Quick test QT

Connection for individual tests differs depending on the test group selected.

QT = Quick test - Access to individual tests within a test group.

To access Quick Test mode:



Connection for individual tests differs depending on the test group selected.

Options:

Class 1

- Continuity (Uses P1 probe)
- Insulation 500 V
- Insulation 250 V
- Substitute Leakage
- Mains Leakage (needs mains connection)

Class 2

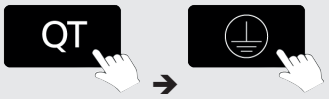
- Insulation 500 V (uses P1 probe)
- Insulation 250 V (uses P1 probe)
- Substitute leakage (uses P1 probe)
- Mains leakage (uses mains connection and P1 probe)
- SELV measurement (uses P1 and P2 probes)

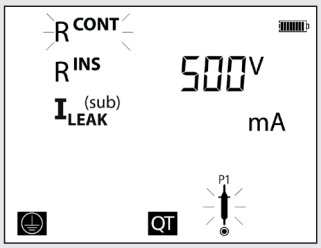
Extension lead

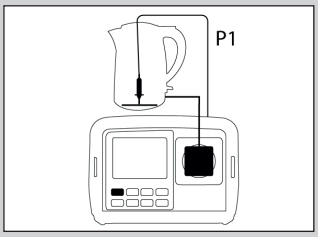
- Continuity (uses extension lead adaptor)
- Extension Lead, Insulation 500 V
- Extension Lead, Insulation 250 V
- Polarity (uses extension lead adaptor)

6.14 Quick test QT options

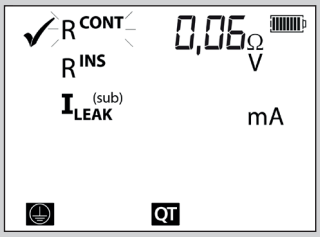
Example 1- Class 1 continuity.

1. 

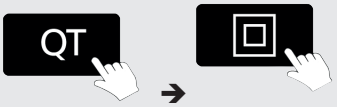
2. 

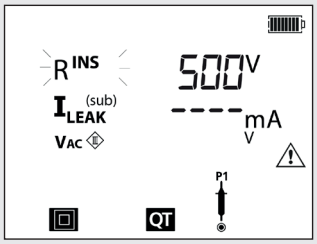
3. 

4. 

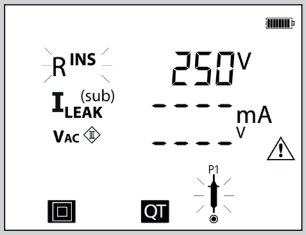


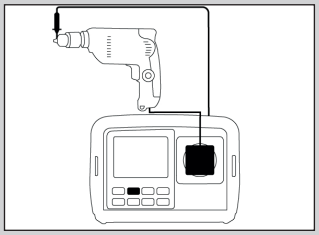
Example 2 – Class 2 250 V Insulation test

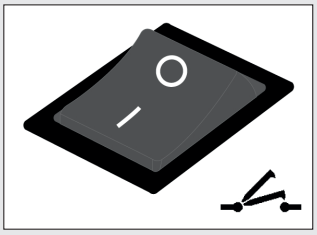
1. 

2. 

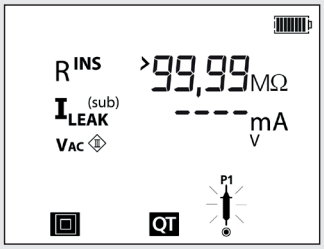
3. 



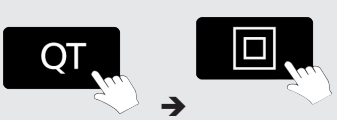
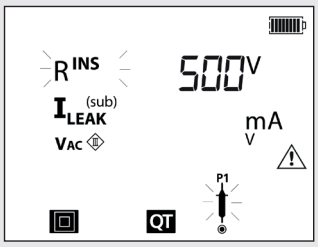
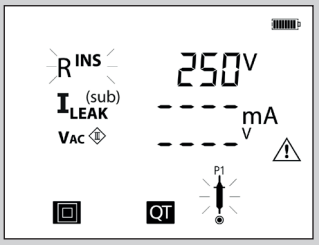
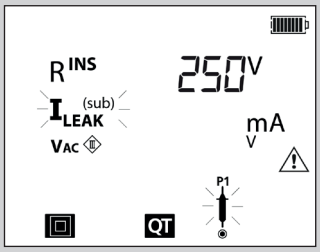
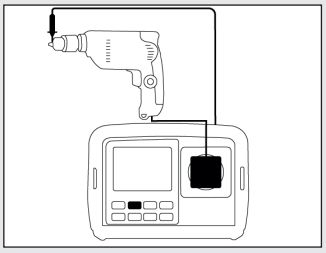
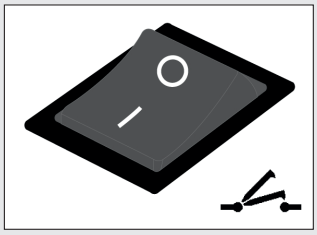
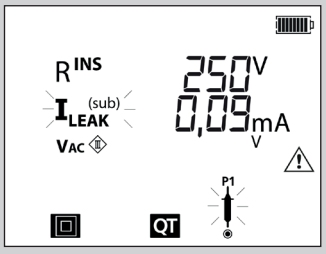
4. 

5. 

6. 



Example 3 – Class 2 touch leakage test using the Substitute (or alternative) method.

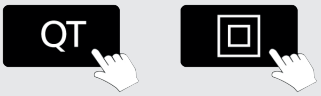
1.		2.	
3. 		4. 	
5.		6.	
7. 		8. To repeat test	

NOTE : To switch between test groups, press the test group buttons. To exit press the ⏻ button

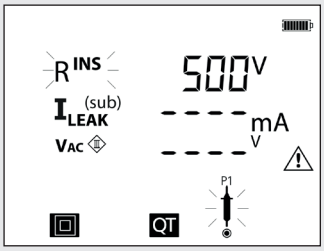
6.15 SELV measurement within Quick Test (QT)

Separated Extra Low Voltage (SELV) measurement is performed automatically when the PAT250SX is connected to the electrical supply.

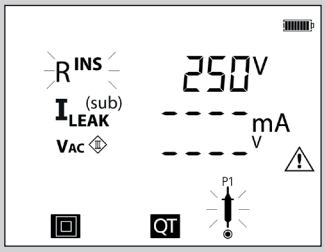
1.



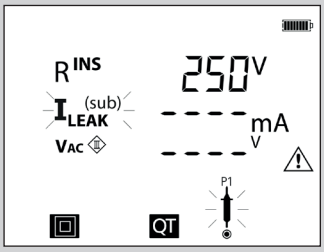
2.



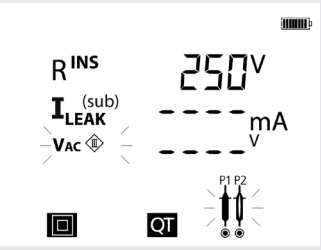
3.



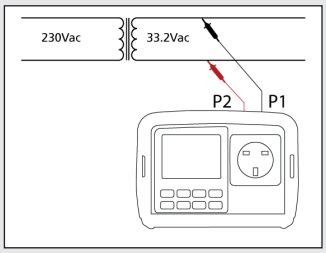
4.



5.

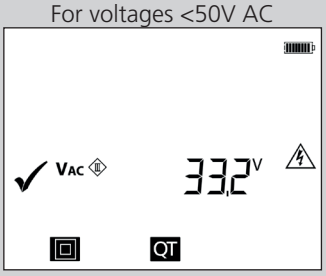


6.

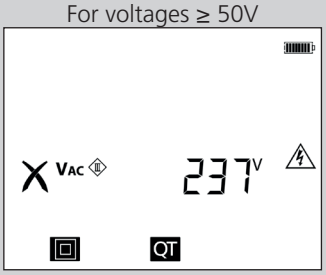


7.

For voltages <50V AC



For voltages ≥ 50V

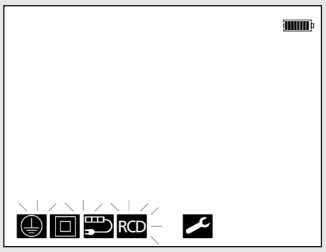


8. To exit Quick Test (QT) mode

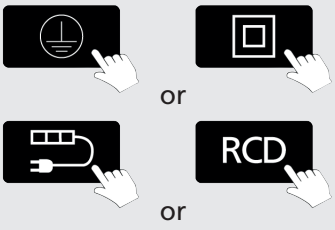
7. SETUP

Changing PASS limits and test times

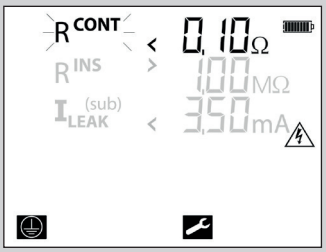
1. 



2. To select a TEST GROUP to be modified press the relevant button:



3. Screen displayed



4. Keep pressing the TEST GROUP button to select the test to be changed

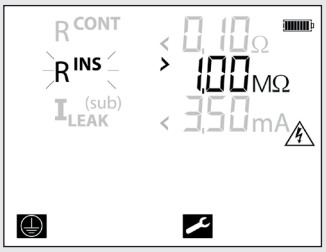
Pass Limit

Default	Rcont	0.01 Ω
1st press	Rins	1.00 MΩ
2nd press	I leak	3.50 mA

Test Time

3rd press	Rcont	5: S
4th press	Rins	5: S
5th press	I leak	5: S

5. Example changing Insulation pass limit

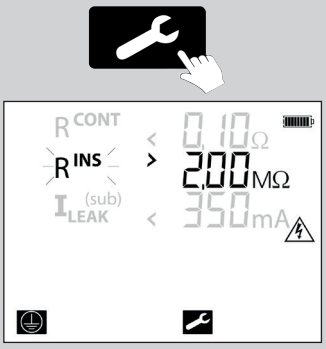


6. Pressing SETUP button changes the value

Note : Pressing QT changes the direction

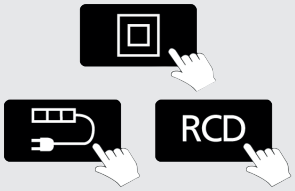
Default	1.00 MΩ
1st press	2.00 MΩ
2nd press	0.01 MΩ
3rd press	0.05 MΩ
4th press	0.25 MΩ
5th press	0.30 MΩ
6th press	0.50 MΩ

7. Example: RINS change to 2.00 MΩ



8. To SAVE changes to setup

9. or, to edit new test groups



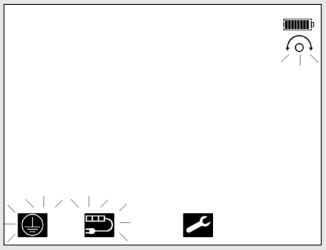
10. When changes are complete press the Power button

8. Continuity lead null

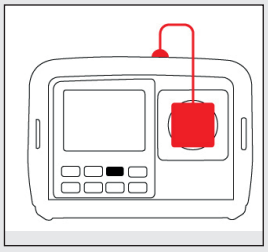
Removes the resistance of the CONTINUITY test leads from the measured value

8.1 To NULL the resistance of the IEC test lead or an extension lead

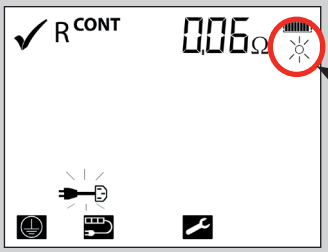
1. >2 seconds



2.



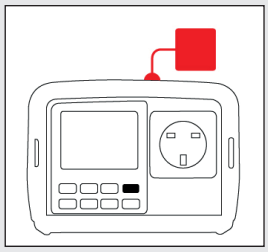
3.



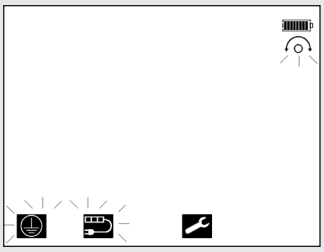
IEC test lead NULL ON

8.2 To remove the lead null

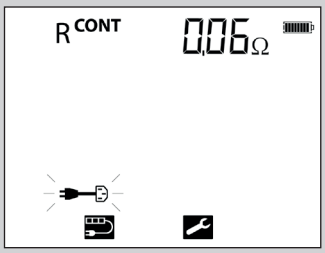
1.



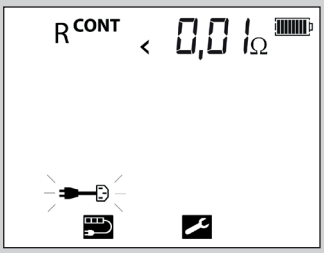
2. >2 seconds



3.

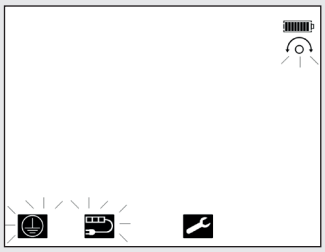


4.

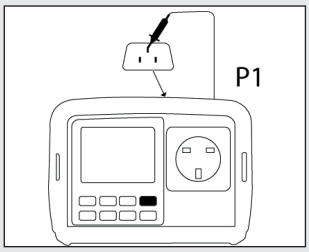


8.3 To NULL the resistance of the P1 continuity test lead

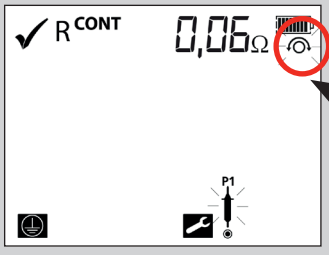
1. >2 seconds



2.



3.



Continuity (P1) lest lead NULL ON

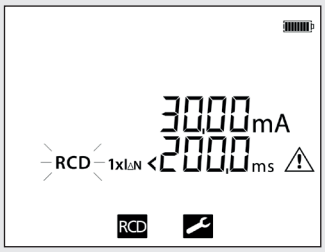
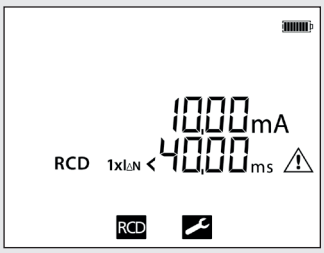
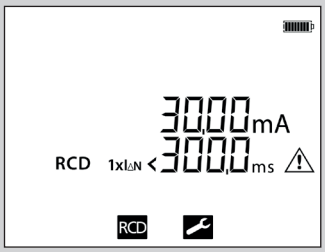
To exit Lead null setup

9. RCD configuration

9.1 Portable RCD trip current selection

Portable RCD current rating can be changed between 10 mA and 30 mA.

Portable RCD trip time for 30 mA can be set at either 200 ms (for BS 7671 conformity) or 300 ms (for IEC 61540 conformity).

1. 	 x2 	Press RCD button to change from 30 mA to 10 mA For 10mA RCD 	
2. To change trip time 		 **To exit RCD configuration**	

10. Factory reset to Default settings

10.1 Factory default settings

SETUP - change test pass limits, test times and test lead resistance. SETUP is "test group based" as the PASS limit for a Class 1 insulation test is different to a Class 2 insulation test.

10.2 Factory Default Test Limits

Variant Model	R_{PE}, R_{CONT} (Ω)	R_{PE}, R_{CONT} (Ω) for Ext lead	R_{PE}, R_{CONT} (Ω) for RCD	Class 1 R_{ISO}, R_{INS} (MΩ)	Class 2 R_{ISO}, R_{INS} (MΩ)	Ext lead R_{ISO}, R_{INS} (MΩ)	Class 1 I_{EA}, $I_{LEAK(sub)}$, I_{PE}, I_{LEAK} (mA)	It, I^B Class 2 I_{EA}, It(sub) (mA)	1xIΔN30 (ms)	5xIΔN30 (ms)	1xIΔN10 (ms)	5xIΔN10 (ms)
PAT250SX-UK	0.2	0.2	0.2	1	2	1	3.5	0.25	200	40	200	40
PAT250SX-DE, PAT250SX-CH, PAT250SX-EU	0.3	0.3	0.3	1	2	1	3.5	0.5	300		300	
PAT250SX-AU	1	1	1	1	1	1	5	1	300		40	

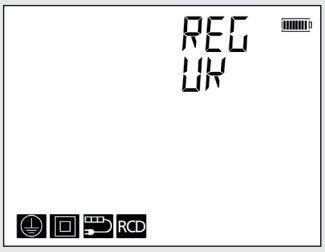
11. Region selection

1. To return an instrument to Factory Default settings

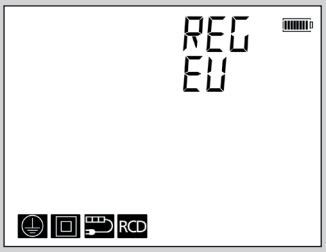
Press

together for 2 seconds

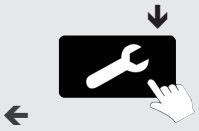
2.



3.



4.

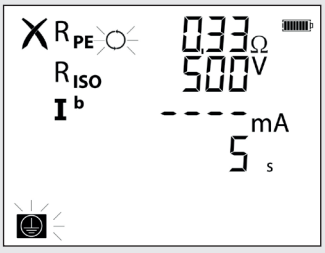


11.1 International model variations:

Continuity retest after fail (PAT250SX DE, and CH models only)

When a continuity test fails to meet the pre-set continuity resistance pass limit of 0.3 Ω, the test can be run again within 5 seconds at the higher 1.0 Ω limit.

Example Class 1 continuity FAIL. Display shows:



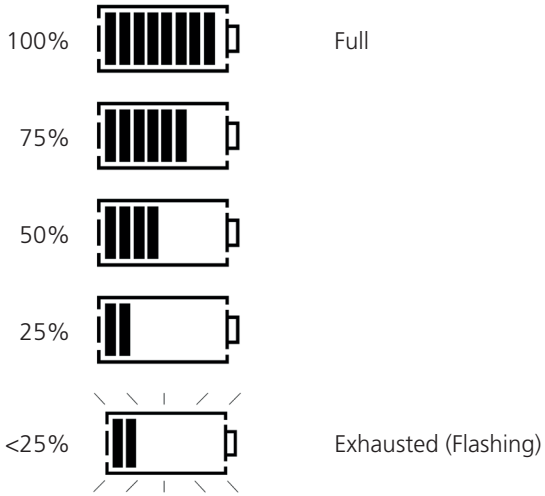
to retest at 1.0 Ω limit or

to FAIL test

12. Battery and Fuse replacement

Battery type: 8 x 1.5 V Alkaline LR6 (AA) or NiMH HR6 rechargeable

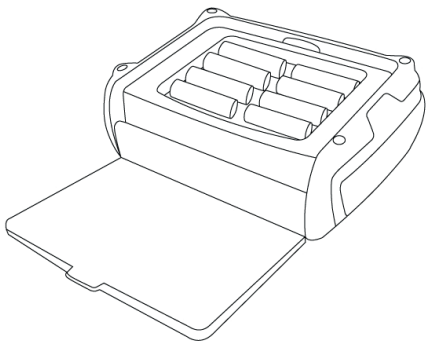
Battery condition is shown by the following display symbols:



To replace batteries or fuse:

- Switch off the instrument.
- Disconnect the instrument from all electrical circuits.

12.1 Battery replacement



Remove the battery cover from the base by using a cross head screwdriver to unscrew the battery cover fixing screw.

Spent Alkaline and NiMH batteries are classified as portable batteries and should be disposed of in the UK in accordance with Local Authority requirements. For disposal of batteries in other parts of the EU contact your local distributor.

Megger is registered in the UK as a producer of batteries. The Registration number is BPRN 00142

12.2 For battery replacement:

1. Remove old cells and refit new batteries following correct polarity as marked on the battery holder.

   Either: 8 x 1.5 V AA / LR6 Alkaline

   8 x 1.2 V AA / LR6 NiMH

2. Replace the battery cover.

WARNING : Incorrect battery cell polarity can cause electrolyte leakage, resulting in damage to the instrument.

WARNING : Do not mix battery technologies

WARNING : Do not use batteries with different charge state.

12.2.1 Rechargeable batteries and battery charging

All PAT testers accept alkaline or rechargeable NiMH cells.

The PAT250SXR can be recharged using the supplied battery charger.

12.2.2 To charge the batteries:

ATTENTION : Ensure fitted batteries are of the rechargeable NiMH type.

Connect the 15 V DC plug of the charger to the socket on the connection panel of the PAT marked ⊖⊙⊕

WARNING : The instrument should be fully disconnected and not used during the charging process.

WARNING : Do not attempt to recharge non-rechargeable (Primary) cells. Doing so may result in instrument damage and may cause personal injury.

WARNING : Only use a Megger approved PAT charger. Other chargers may present a fire risk.

Ensure ambient temperatures are between 4 °C and 40 °C while charging the PAT.

12.2.3 Fuse replacement

Possible fuse failure is indicated by the symbol. ▭

For fuse replacement

- Remove battery cover as above.
- Withdraw fuse and check for failure.
- Replace with a fuse type:
  1 x 100 mA (F) 250 V 1.5 KA HBC 4 x 20 mm

13. Maintenance

NOTE : There are no user replaceable parts within this product, other than the battery cells and the fuses.

13.1 General maintenance

Test leads should be checked before use to ensure there is no damage.

Ensure batteries are removed if the instrument is left unused for an extended period.

When necessary, the instrument can be cleaned with a damp cloth.

Do not use alcohol based cleaners as these may leave a residue.

13.2 Cleaning

Disconnect from mains power / charger.

Switch off and remove battery cells.

Wipe the instrument with a clean cloth dampened with either water or isopropyl alcohol (IPA).

14. Specifications

Specification	Detail
Environmental condition:	
Operating ambient	20 °C
Humidity	Nominal humidity
Continuity test	
Test voltage	Compliance Voltage: +4 V DC -0% / +30% (open circuit)
Test current	Bi-directional +100 mA -0% +50 mA (into 2 Ω load)
Continuity accuracy	Resistance: ± 5% ± 3 digits (0 to 19.99 Ω)
Resistance resolution	10 mΩ
Display range	0.01 to 19.99Ω
Continuity test nulling	Up to 9.99 Ω
Test time	User selectable from 2 sec to 20 sec or selected during test to 180 sec
Insulation test	
Insulation test	250 V DC –0 % /+25 % open circuit
	500 V DC –0 % /+25 % open circuit
	≥ 500V –0% DC across 0.5 MΩ load
Short circuit/charge current	< 2 mA DC
Insulation accuracy	±3% ±10 digits (0 to 19.99 MΩ)
Resolution	0.01 MΩ
Display range	0.10 MΩ to 99.99 MΩ
Test duration	User selectable from 2 sec to 20 sec or selected during test to 180 sec
Substitute leakage test	
Leakage current Accuracy	± 5% ± 3 digits
Test frequency	Nominal mains frequency 50Hz
Test voltage	< 50 V AC
Leakage Current Resolution	0.01 mA
Display range	0.10 to 19.99 mA
Test duration	User selectable from 2 sec to 5 seconds Reading corrected to 230V AC .
Differential leakage current	
Test voltage	Nominal supply voltage 230 V AC
Test frequency	Nominal mains frequency 50 Hz
Test accuracy	±5% ±3d ±3uA/A
Resolution	0.01 mA
Display range	0.10 to 19.99 mA
Test duration	User selectable from 2 sec to 5 seconds

Specifications

Touch current test	
Test voltage	Nominal mains 230 V AC
Test frequency	Nominal mains 50 Hz
Test accuracy	± 5% ± 3 digits
Resolution	0.01 mA
Display range	0.10 to 3.99 mA
Test duration	User selectable from 2 sec to 5 sec
SELV device test	
Test voltage	0 to 300 V AC
Measurement accuracy	± 3% ± 3 digits
Resolution	0.1 V AC
Display range	0.1 to 300 V AC
Extension lead test	
Test includes Insulation and Bond tests.	
Test voltage	5 V
Polarity	Lead OK
	Live neutral shorted
	Live neutral reversed
	Live/neutral open circuit
Portable RCD test	
Test voltage	Nominal mains 230 V
Test frequency	50 Hz
Test current accuracy	+2% to +9% (1 x I, 5 x I)
Trip time accuracy	±1% ± 1 ms
Trip time resolution	0.01 ms
Display range	0 to 200 ms (1 x I)
	0 to 40 ms (5 x I)
Mains supply test	
Frequency measurement range	50 Hz
Test voltage	40 to 300 V AC
Accuracy	± 3% ± 3 digits
Resolution	0.1 V AC
Display range	40 to 300 V AC
Circuit test	
(Carried out automatically, not available to user)	
Test voltage	5 V
Test frequency	Nominal Mains 50 Hz
Test current	< 100 mA short circuit

Safety	
Instrument designed to IEC 61010-1: 2010	
Test leads designed to IEC 61010-031: 2008	
300 volts to Earth Category II	
Mains fuse protection to 250 volts rms AC	
EMC	
Design to meet IEC 61326-1: 2012 and IEC 61326-2-2: 2005.	
Performance standard	
BS EN 50699:2020 BS EN 50678:2020	
Fuse	
(User replaceable)	
UK variants has mains plug fuse	
One F 100 mA 250 V, 5 x 20 mm HBC fuse.	
Environmental	
Operating temperature range	0 °C to +40 °C
Storage temperature range	-20 °C to +60 °C
Humidity	90%RH @ +10 °C +30 °C
	75%RH @ +30 °C to +40 °C
Maximum altitude	2,000m to full safety spec.
IP rating	IP40 (with front cover closed)
Batteries	
Battery life	> 30 hrs 20sec:2min Test:Standby ratio
Battery type	Supply voltage
	12 V DC (Alkaline AA LR6)
	9.6 V DC (NiMH AA LR6)
Weight	
PAT250SX (instrument only):	1300 g (45.8 oz)
Shipping weight:	2795g (98.6 oz)
PAT250SXR (instrument only):	1300 g (45.8 oz)
Shipping weight:	2975g (104.9 oz)
Dimensions	
Dimensions (instrument and case)	203 mm (L) x 148 mm (W) x 78 mm (H)
	(8 x 5.7 x 3.2 inches)
Dimensions (instrument and packaging)	456 mm (L) x 178 mm (W) x 89 mm (H)
	(18 x 7.1 x 3.5 inches)

15. Calibration, Repair and Warranty

Megger operate fully traceable calibration and repair facilities to make sure your instrument continues to provide the high standard of performance and workmanship that is expected. These facilities are complemented by a worldwide network of approved repair and calibration companies, which offer excellent in-service care for your Megger products.

For service requirements for Megger instruments contact:

Megger Limited Archcliffe Road Dover Kent CT17 9EN **U.K.** Tel: +44 (0) 1304 502 243 Fax: +44 (0) 1304 207 342	OR	**Megger Valley Forge** 400 Opportunity Way Phoenixville PA 19460 **U.S.A.** Tel: +1 610 676 8579 Fax: +1 610 676 8625

15.1 Return procedure

WARNING : Remove the battery cells before shipping this instrument.

UK and USA Service Centres

1. When an instrument requires recalibration, or in the event of a repair being necessary, a Returns Authorisation (RA) number must first be obtained from one of the addresses shown above. The following information is to be provided to enable the Service Department to prepare in advance for receipt of your instrument and to provide the best possible service to you:
   - Model (for example, PAT250SX).
   - Serial number (found on the display under settings, device information, or on the rear cover and by the batteries or on the calibration certificate).
   - Reason for return (for example, calibration required, or repair).
   - Details of the fault if the instrument is to be repaired.
2. Make a note of the RA number. A returns label can be emailed or faxed to you if required.
3. Pack the instrument carefully to prevent damage in transit.
4. Before the instrument is sent to Megger, freight paid, make sure that the returns label is attached or that the RA number is clearly marked on the outside of the package and on any correspondence. Copies of the original purchase invoice and packing note should be sent simultaneously by airmail to expedite clearance through customs. In the case of instruments which require repair outside the warranty period, an immediate quotation can be provided when obtaining the RA number.
5. Track the progress online at **www.megger.com**.

16. Decommissioning

16.1 WEEE Directive

The crossed out wheeled bin symbol placed on Megger products is a reminder not to dispose of the product at the end of its life with general waste.

Megger is registered in the UK as a Producer of Electrical and Electronic Equipment. The Registration No is WEE/ HE0146QT.

For further information about disposal of the product consult your local Megger company or distributor or visit your local Megger website.

16.2 Battery disposal

The crossed out wheeled bin symbol placed on a battery is a reminder not to dispose of batteries with general waste when they reach the end of their usable life.

For disposal of batteries in other parts of the EU contact your local Megger branch or distributor.

Megger is registered in the UK as a producer of batteries (registration No.: BPRN00142).

For further information see www.megger.com

The crossed out wheeled bin symbol placed on the batteries is a reminder not to dispose of them with general waste at the end of their life.

This product contains the following batteries:

8 x AA Alkaline (LR6) 1.5V primary cells or
Nickel Metal Hydride NiMH (HR6) 1.2V secondary cells

They are located in the battery compartment on the rear of the instrument

They can be safely removed by ensuring all test leads have been disconnected from the instrument prior to removing the battery cover with a suitable screwdriver.

Spent PAT100 batteries are classified as Portable Batteries and should be disposed of in the UK in accordance with Local Authority requirements

For disposal of batteries in other parts of the EU contact your local Megger company or distributor.

Megger is registered in the UK as a producer of batteries.

The Registration number is BPRN00142

For Further information see www.megger.com

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The company reserves the right to change the specification or design without prior notice.

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www.megger.com

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