
SEN60204

MACHINERY DIRECTIVE TESTER

259A910

OPERATING INSTRUCTIONS

259A550 REV C



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NOTICE

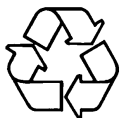
Data may be lost or altered in virtually any electronic memory under certain circumstances. Therefore Seaward Electronic assumes no responsibility for financial losses or claims due to data lost or otherwise rendered unusable whether as a result of abuse, improper use, defects, disregard of operating instructions or procedures, or any other allied causes.

The information in this manual is subject to change without notice.

SEN60204 INTERNAL BATTERY

The SEN60204 Machinery Directive Tester contains an internal rechargeable battery to maintain the memory when the unit is switched off. In order to ensure that this battery maintains operability the following procedure should be followed:-

- On receipt of the SEN60204, clear the memory and leave the unit switched on for 16 hours.
- If the SEN60204 will not be in use for any length of time the previous test results should be downloaded into a printer or computer prior to the unit being stored or the unit should be periodically switched on for 16 hours to ensure full charge.
- When the SEN60204 has not been used for a period of time then the battery may be heavily discharged. If the results of prior tests have not been previously downloaded it is advisable to ascertain if the tests are not corrupt by carrying out the downloading sequence. If the memory is intact then charge the battery for one hour prior to further testing or down load the memory and leave the SEN60204 on charge for 16 hours.

BATTERY DISPOSAL

The built-in rechargeable nickel-cadmium batteries contain substances which may pollute the environment.

When replacing the batteries or disposing of this instrument in due course, please ensure that the batteries are separated from normal refuse and that they are disposed of by an officially assigned procedure.

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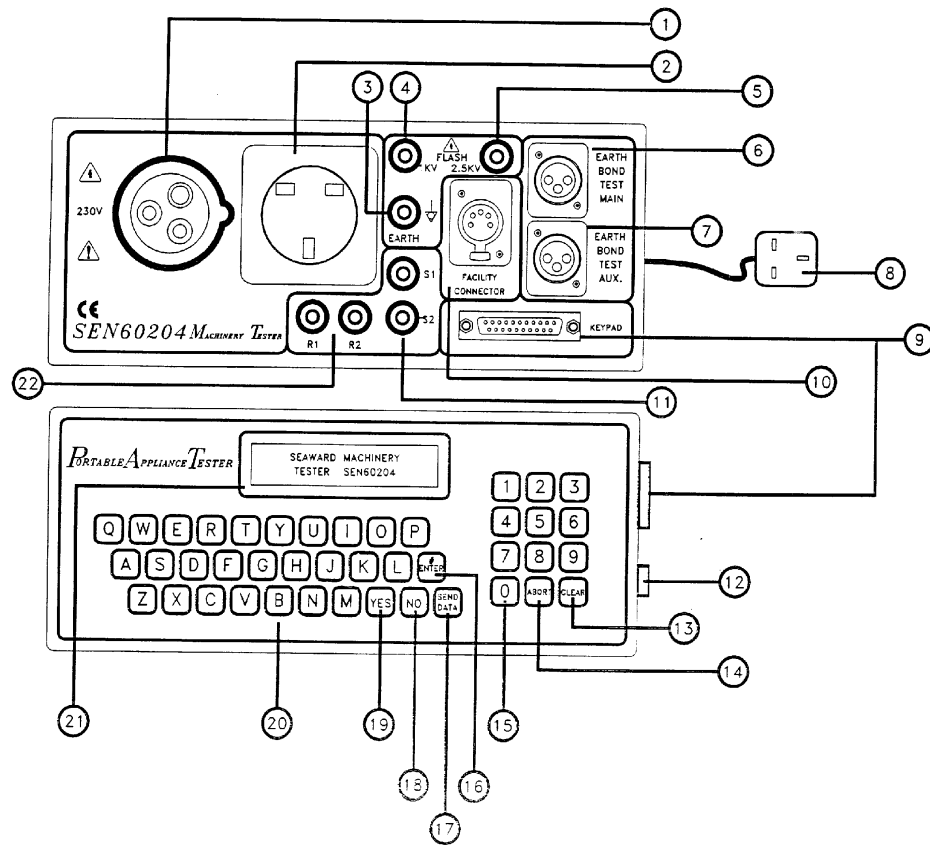


Figure 1

EXAMPLE OF PRINTOUT IN LIST FORMAT

TEST NUMBER 0001
DATE 10-OCT-96
APP NO 000000TEST
TEST MODE MAN
BOND TEST I = 25A
PE AREA 1.0 sq mm
BOND >.500 R F
INS > 300.00 MEG P
OPER . kVA S
LKGE . mA S
VOLTS DECAY S
USER 0000000000
END OF DATA

CONNECTORS AND OPERATIONAL INTERFACE

- ① 16A 230V BS4343/CEE17 Machinery Test Socket.
- ② 13A 230V BS1363 Machinery Test Socket.
- ③ Voltage/Insulation Earth Clip Connector.
- ④ 1.0kV Voltage/Insulation Probe Connector.
- ⑤ 2.5kV Voltage/Insulation Probe Connector.
- ⑥ Protective Bonding Measurement Connector.
- ⑦ Auxiliary Protective Bonding Measurement Connector.
- ⑧ 230V Mains Supply.
- ⑨ 25-way Data Interconnection Lead.
- ⑩ Facility Connector/Voltage Interlock.
- ⑪ S1/S2 Remote Voltage Sense Connectors.
- ⑫ RS232 /Barcode Reader/Printer Port.
- ⑬ Clear Key.
- ⑭ Abort Key.
- ⑮ Numeric Keypad.
- ⑯ Enter or # key.
- ⑰ Data Key.
- ⑱ (No) Key.
- ⑲ (Yes) Key.
- ⑳ Alpha Keypad.
- ㉑ LCD Display.
- ㉒ R1/R2 Remote Residual Voltage Decay Measurement Connector.



SAFETY

READ THE INSTRUCTIONS BEFORE USE

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

The SEN60204 performs a number of electrical tests which involve high voltages and high currents. Never touch the machinery being tested while the testing procedure is being followed .

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

- Caution - Risk of electric shock (Test voltages greater than 1000V AC may be present).
- Caution - (refer to accompanying documents).

The residual voltage reading is only an indication of the voltage remaining at the machine's plug / terminal connections.

DO NOT ASSUME THAT THERE ARE NO HAZARDOUS VOLTAGES REMAINING WITHIN THE MACHINE UNDER TEST.

GETTING STARTED

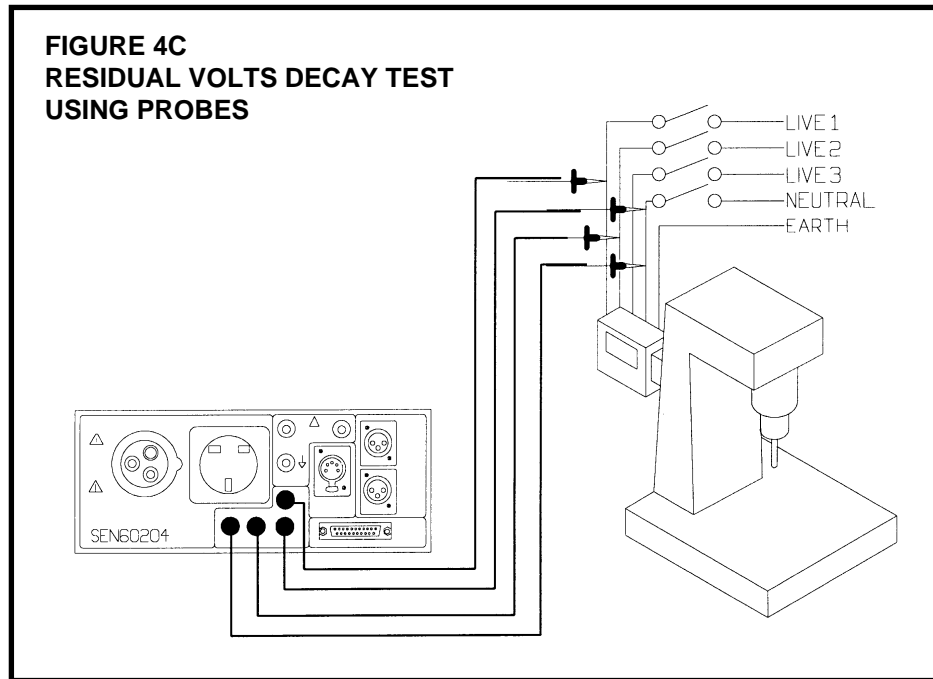
On receiving your SEN60204 tester:

- Read the instructions.
- Assemble tester with interconnection lead between keypad and main unit.
- Plug in tester and leave for a minimum 16 hours to charge backup battery.
- Clear the Memory

EXAMPLE OF PRINTOUT IN CERTIFICATE FORMAT

TEST CERTIFICATE TO EN60204			
DATE OF TEST	10-OCT-96	EQUIPMENT NUMBER	TEST
TEST MODE	MAN	VISUAL CHECK	S
PROT BOND TEST CURRENT	25A	PE AREA	1.0 sqmm
PROT B 1 > . 500 R F	PROT B 2 . R S	PROT B 3 . R S	
PROT B 4 . R S	PROT B 5 . R S	PROT B 6 . R S	
PROT B 7 . R S	PROT B 8 . R S	PROT B 9 . R S	
PROT B10 . R S	PROT B11 . R S	PROT B12 . R S	
PROT B13 . R S	PROT B14 . R S	PROT B15 . R S	
PROT B16 . R S	PROT B17 . R S	PROT B18 . R S	
PROT B19 . R S	PROT B20 . R S	PROT B21 . R S	
PROT B22 . R S	PROT B23 . R S	PROT B24 . R S	
PROT B25 . R S	PROT B26 . R S	PROT B27 . R S	
PROT B28 . R S	PROT B29 . R S	PROT B30 . R S	
INS 1>300.00 . M P	INS 2 . M S	INS 3 . M S	
INS 4 . M S	INS 5 . M S	INS 6 . M S	
INS 7 . M S	INS 8 . M S	INS 9 . M S	
INS 10 . M S	INS 11 . M S	INS 12 . M S	
INS 13 . M S	INS 14 . M S	INS 15 . M S	
VOLTS 1	S	VOLTS 2	S
VOLTS 3	S	VOLTS 4	S
VOLTS 5	S	VOLTS 6	S
VOLTS 7	S	VOLTS 8	S
VOLTS 9	S	VOLTS 10	S
VOLTS 11	S	VOLTS 12	S
VOLTS 13	S	VOLTS 14	S
VOLTS 15	S		
LOAD . kVA S	LKGE . mA S	VOLTS DECAY	S
USER	P = PASS, F = FAIL, S = SKIP, A = ABORT		
TESTED BY DATE			
TEXT			

**FIGURE 4C
RESIDUAL VOLTS DECAY TEST
USING PROBES**



FEATURES

DESCRIPTION

The SEN60204 is one of the most advanced machinery directive testers available, providing a comprehensive guide to the electrical safety of 230V and (with 3 phase adaptor) 400V machines.

The SEN60204 is microprocessor controlled and enables the user to select either Manual, Automatic or Testcode mode of operation. Alternatively the SEN60204 may be controlled by the RS232 serial port of a computer.

All internal power and test outputs for single phase testing are derived from the 230V mains supply.

The equipment performs the test selected by the user and records the results in its internal memory which is capable of storing 265 sets of test results.

To speed up data entry, the machine identity number, test code number and user code can all be entered into the SEN60204 by a bar code reader.

In addition to test results the memory also records the machinery identity number, the testers identity and the date of testing. Selectable preset pass/fail limits have been programmed into the SEN60204 and the test result is clearly displayed on the instruments liquid crystal display and on any hard copy printout.

A fully charged battery backed memory will store results for up to six months without being reconnected to the supply for re-charging. However, it is recommended that the contents of the memory are printed out or down loaded to a PC daily after use.

Particular features of this product are:

- Rugged Enclosure.
- Compatibility with PATS+ software & Seaward PatGuard.
- Bar code reader input.
- Remote control facility.

LAYOUT

The SEN60204 is contained in a robust polyethylene moulded case with an integral carrying handle and separate keypad. Power supplies, EN60.309 / Local machine power sockets and high voltage / power components are housed in the main enclosure. The microprocessor, keypad input, display and I/O port are housed in the smaller keypad enclosure. The keypad has a "qwerty" layout with the numbers grouped on the right hand side.

The keypad is held in place by two over-centre latches.

The mains input connector and test leads are housed behind two side panels held in place by quick release fasteners. Hand tools are not required to operate or access the SEN60204.

Figure 1 details the connectors and front panel layout.

The main unit is connected to the keypad by a 25 way screened interconnection lead.

The SEN60204 performs eight functions:

- Visual Inspection
- Protective Bonding Test
- Insulation Test
- Voltage Test
- Pre-Load Test
- Operations Test
- Leakage Test
- Residual Volts Decay Test

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

SAFETY FEATURES

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

- A monitor between neutral and earth connection to the SEN60204 which inhibits testing if a potential of greater than a nominal 50V exists (as with a reversed polarity or open circuit protective earth connection). The inhibit can be overridden if the user decides it is safe to continue e.g. when using an isolating transformer.
- The unit has a default Pass/Fail level for each test. In addition a preset trip level has also been incorporated for each test which will terminate the test if the measured level exceeds this value. The exact trip level will vary according to test but will normally be approximately 120% of the maximum Pass/Fail level.
- An electronic cut-out which provides rapid disconnection of internal relays where test results are detected which are in excess of 5 times the fail limit.

Use of the SEN60204 is straight forward. Plug the tester into a suitable power source and follow the instructions on the LCD display.

Variations of the standard instrument are available to suit international voltages and connecting sockets, details of those available are listed under the section "Specifications".

APPLICATIONS

The SEN60204 is designed to check and record the electrical safety of machinery.

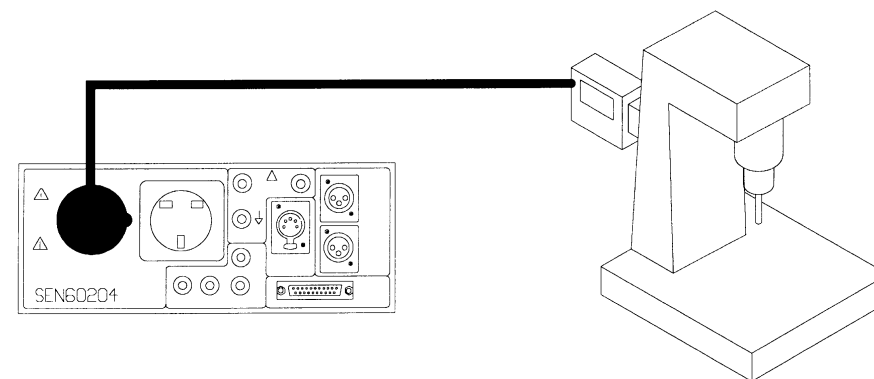
The standard EN 60204-1 describes the general requirements for the testing of the electrical safety of machinery and in general covers type approval tests. The SEN60204 is designed to perform tests as directed by this standard and is also suitable for reconfirming the electrical safety of machinery after it has been serviced, repaired or modified.

The same sequence of tests can be carried out on either 230V or 400V machinery. Testing 400V machinery will require the use of a Three Phase Adaptor.

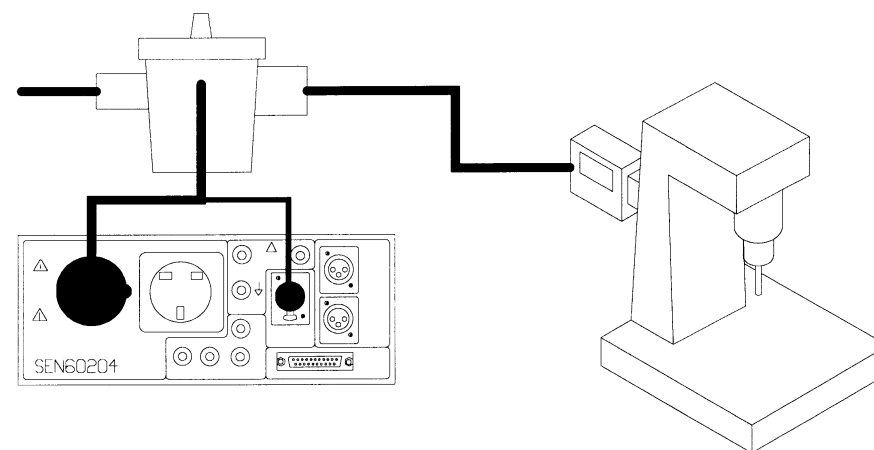
NOTE: When testing 400V machinery. The Functional Test will be performed from a Three Phase supply and therefore the SEN60204 will not display or record an Operation or Leakage result.

The SEN60204 allows testing of the safety of any electrical switchboards associated with a machine, to the requirements of standard EN60439-1, EN60439-3.

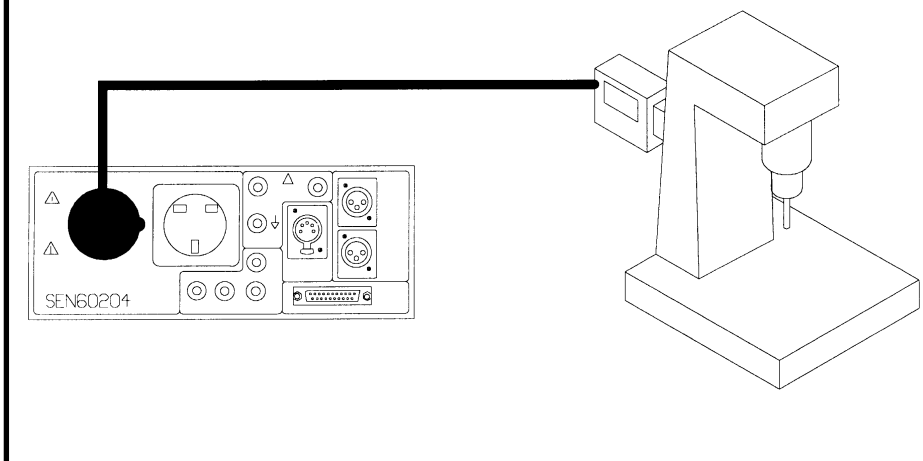
**FIGURE 4A
FUNCTIONAL TESTS**



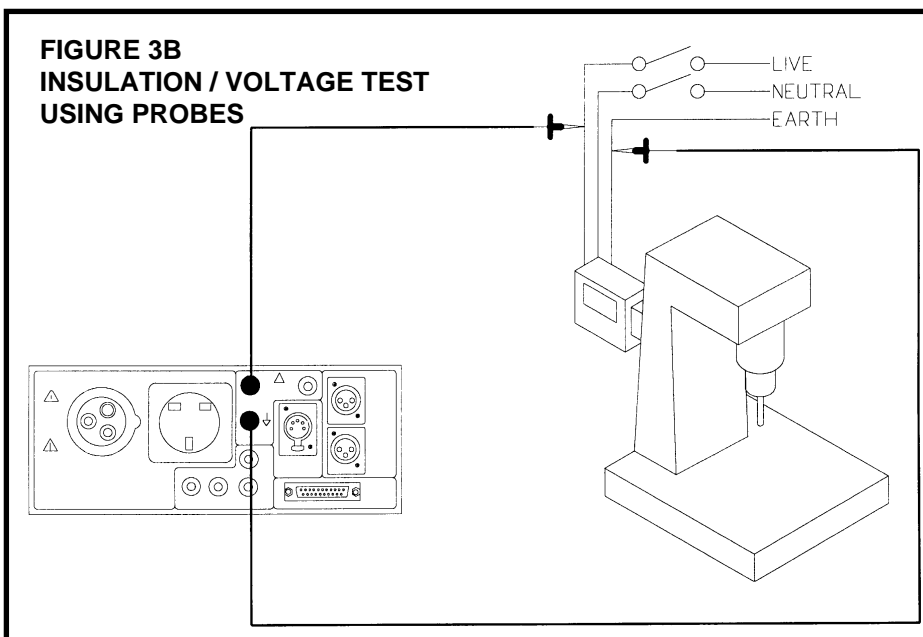
**FIGURE 4B
FUNCTIONAL TESTS USING A THREE PHASE ADAPTOR**



**FIGURE 3A
INSULATION / VOLTAGE TEST**



**FIGURE 3B
INSULATION / VOLTAGE TEST
USING PROBES**



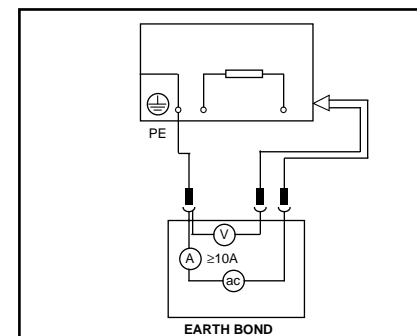
Eight different tests are performed by the SEN60204 and these are described as follows:

VISUAL INSPECTION

General

The objective of the visual check is to confirm that the machinery under test is not damaged and thereby safe to test.

PROTECTIVE BONDING TEST- EN 60204.1.20.2, EN 60439.1.8.3.3



General

The objective of this test is to ensure that the connection between the earth or protective conductor of the machinery's mains plug / incoming supply terminal earth connection and the metal casing and accessible parts of the machinery is satisfactory and of low enough resistance value to satisfy accepted safety standards. The SEN60204 directive indicates that the test should be performed with a current of at least 10A. The measured voltage between the earth terminal and the points of test shall not exceed the values given in Table 1 (below). There is an alternative current of 25A which can also be selected for other equipment, but with a maximum duration of 10 seconds.

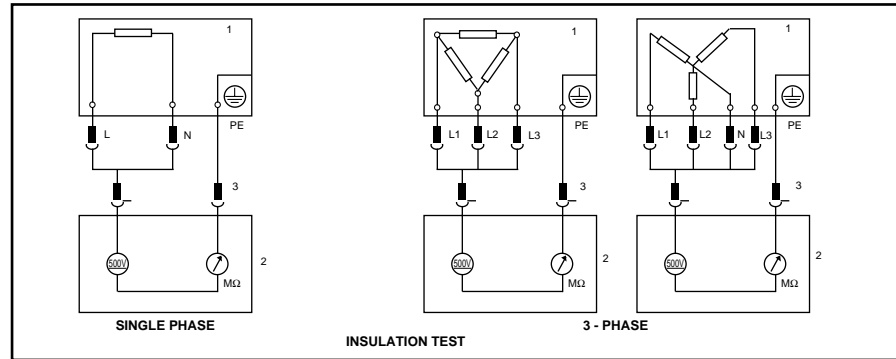
Minimum effective protective conductor cross-sectional area of	Maximum measured voltage drop (V) 10A	Maximum equivalent resistance
1.0 sq mm	3.3	0.33Ω
1.5 sq mm	2.6	0.26Ω
2.5 sq mm	1.9	0.19Ω
4.0 sq mm	1.4	0.14Ω
> 6.0 sq mm	1.0	0.10Ω

Technical Table 1

The SEN60204 applies a low voltage of approximately 10 volts ac rms between the earth or protective conductor of the machinery's mains plug earth pin / main protective conductor terminal and the lead connected to the protective bonding test clip, a high current $\geq 10A$ (or 25A) is allowed to flow for a short period (10s defined by EN60204

standard). The voltage between the earth terminal of the power test socket and the Protective Bonding test clip is measured, scaled and displayed. This method of measurement is the Kelvin or 4 wire method. The resistance of the test leads, providing that they do not have appreciable voltage drop at the test current, does not affect the measurement. The objective of the high current is to thermally stress all protective earth connections. The result is displayed as a resistance and the voltage drop that would occur along the protective earth conductor as the result of an actual current of 10A amps flowing. During a 25A test only the resistance is displayed.

INSULATION TEST - EN 60204.1.20.3, EN 60439.1.8.3.4



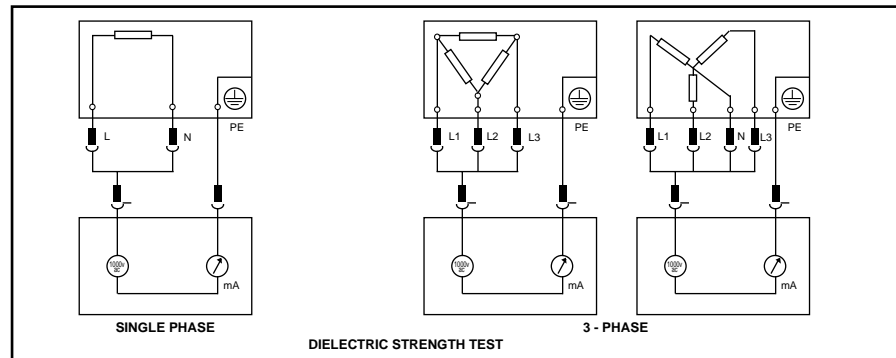
General

The objective of this test is to ensure that the insulation resistance between Earth and Live (Phase) + Neutral connections exceeds the designated test threshold.

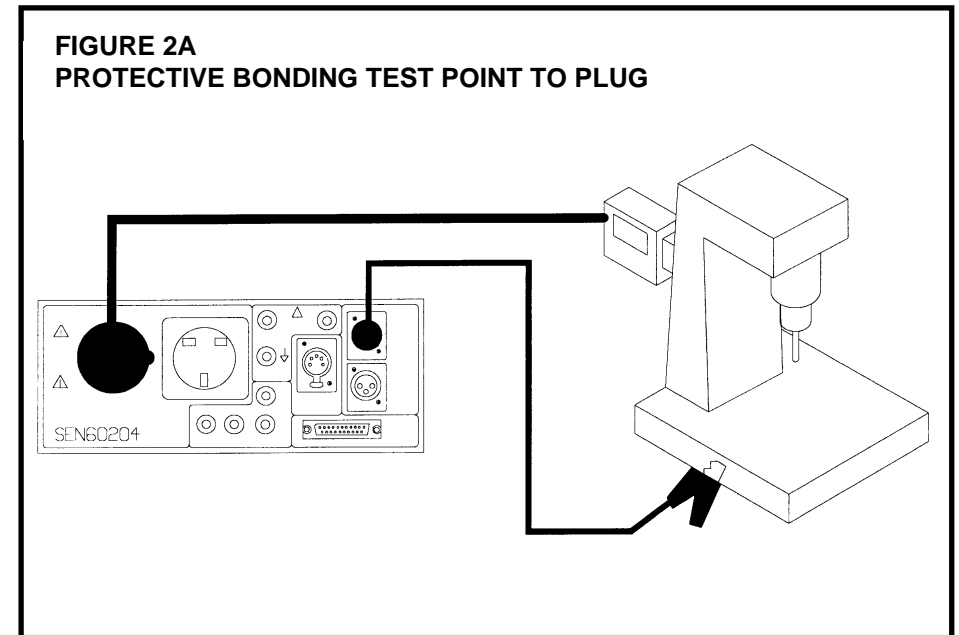
Technical

During the insulation test a voltage of $\geq 500V$ dc is applied between both Live and Neutral (short internally by the SEN60204), the 1KV voltage socket and the earth pin/green socket. The SEN60204 displays the resistance measured and allows the user to confirm sufficient insulation exists.

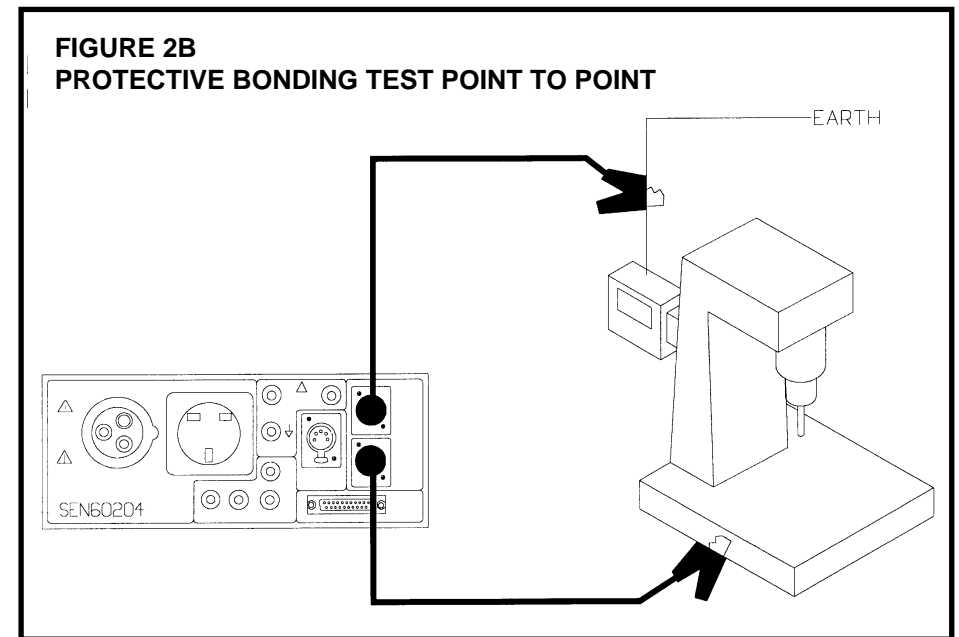
VOLTAGE TEST - EN 60204.1.20.4, EN 439.1.8.3.2



**FIGURE 2A
PROTECTIVE BONDING TEST POINT TO PLUG**



**FIGURE 2B
PROTECTIVE BONDING TEST POINT TO POINT**



ACCESSORIES AVAILABLE

6 MTR EARTH BOND TEST LEAD	PART CODE 249A934
10 MTR EARTH BOND TEST LEAD	PART CODE 249A927
PRINTER LEAD (SERIAL PORT ONLY)	PART CODE 194A906
COMPUTER LEAD (FOR USE WITH PATS SOFTWARE)	
9 - 9 WAY	PART CODE 194A919
9 - 25 WAY	PART CODE 194A920
PATS + SOFTWARE	PART CODE 161A922
MINI PRINTER	PART CODE 194A911
240V 1KVA ISOLATION TRANSFORMER	PART CODE 219A927

UNITS COMPLETE AND PACKED

SEN60204 UK	PART CODE 259A910
SEN60204 GERMAN	PART CODE 259A911
SEN60204 DUTCH	PART CODE 259A912
SEN60204 ITALY	PART CODE 259A913
SEN60204 SWISS	PART CODE 259A914
SEN60204 FRENCH	PART CODE 259A915
SEN60204 SCHUKO	PART CODE 259A916
SEN60204 AMERICAN	PART CODE 259A917

Due to a policy of continuous development Seaward Electronic Limited reserves the right to alter the equipment specification and description outlined in this publication without prior notice and no part of this publication shall be deemed to be part of any contract for this equipment unless specifically referred to as an inclusion within such contract.

259A550-REV B

General

The objective of this test is to ensure that the dielectric strength of the insulating materials between earth or accessible conductive parts and Live/Neutral connections is satisfactory.

SAFETY NOTE

The voltages and currents associated with this test are LETHAL. Suitable precautions must be taken to prevent danger to the tester or any other persons by the provision of barriers or enclosures as appropriate.

If the tester is in any doubt as to the precautions to be taken

DO NOT TEST, SEEK ADVICE FROM A COMPETENT AUTHORITY.

The SEN60204 tester is fitted with an electrical interlock to prevent inadvertent operation of the voltage test. The SEN60204 tester is supplied with a facility plug used as an Safety/Interlock switch. This switch must be closed before commencing the test and held closed for the duration of the test. Opening this switch at any time will terminate the test.

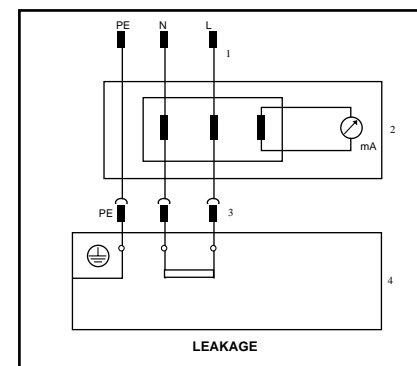
Technical

During this test a voltage $\geq 1000V$ RMS from a transformer rated at ≥ 500 VA is applied for a user determined time between any of the following.

- The 1kV test is applied between both the Live and Neutral (shorted internally by the SEN 60204) the 1kV voltage socket and the 230V sockets earth/green socket.
- The 2.5kV test is applied between the 2.5kV voltage socket and 230V sockets earth/green socket.

NOTE: BOTH SOCKETS ARE SIMULTANEOUSLY LIVE DURING VOLTAGE TEST OPERATION. IT WILL BE NECESSARY TO TEMPORARILY DISCONNECT ANY COMPONENTS NOT RATED TO WITHSTAND THIS TEST VOLTAGE FOR THE DURATION OF THE TEST.

FUNCTIONAL TESTS - EN 60204.1.20.7, EN 60204.1.20.5



The Functional Test consists of four individual tests.

PRE-LOAD TEST

General

The objective of this test is to determine if it is safe to apply full mains power to the machinery under test to perform the operation test.

Technical

Before switching full power to the machine under test the load test is conducted which applies a voltage through a current limiting resistor to the mains supply plug / incoming supply L + N terminals and checks that the current flow will not be excessive when full voltage is applied.

OPERATION TEST

General

The objective of this test is to determine the power taken by the machine under test.

Technical

The machinery under test is energised at 230V for a user defined time. After a short time readings are taken and displayed in KVA based on a nominal supply voltage of 230V .

Note: This function is only available for single phase machines obtaining their power from the SEN60204 front panel sockets. If Three Phase testing is selected then no KVA value is displayed or recorded for load.

LEAKAGE TEST

General

The objective of this test is to determine that earth leakage current is below determined limits. This particular test is of value when machinery incorporates a number of sequences which may change the characteristics of the product during its operation. The test is not a statutory test as described by EN 60204.1 but other standards prescribe limits for earth leakage currents. The leakage test is differential in operation. The displayed result is the difference between the line conductor current and the neutral conductor current.

Technical

During the operation tests described in the above section, the SEN60204 monitors the differential current on the supply to determine the magnitude of the current leaking to earth through the machine under test.

Note: This function is only available for single phase machines obtaining their power from the SEN60204 front panel sockets. If Three Phase testing is selected then no leakage value is displayed or recorded for load.

RESIDUAL VOLTAGE DECAY TEST

General

The objective of this test is to confirm that any voltage remaining after power is removed from the machine falls below the defined level within the defined time.

The SEN60204 displays a PASS / FAIL result according to Table 2.

Supply Connection	Pass Voltage Threshold	Voltage Decay Time
Mains Plug	< 60V	1 s
Terminals	< 60 V	5 s

Table 2

RESIDUAL VOLTAGE

INPUT RANGE: 0 - 500V AC/DC¹
 MEASURING INDICATION: 30 - 370V
 TEST THRESHOLD: 60 - 80V (+10% -0V) > 80V ±10% ±10V
 TEST DURATION: 1 or 5 SECONDS
 EXTERNAL SENSE VOLTAGE: 50 - 500V AC (50 / 60Hz)

OPERATIONS TEST

MEASURING RANGE: 0.05 - 4.0 kVA²
 ACCURACY: ± 5% ±130VA
 TEST DURATION: 0.5, 1, 5, 15 minutes

GENERAL

DIMENSIONS: 410 x 370 x 160 mm
 WEIGHT: 12Kg
 OPERATING TEMPERATURE RANGE: 0 - 40°C
 RELATIVE HUMIDITY: MAX 80% UP TO 31°C
 DECREASING 50% TO 40°C

ENVIRONMENTAL: FOR INDOOR USE ONLY
 ALTITUDE < 2000M
 INSTALLATION CATEGORY II
 POLLUTION DEGREE 2

SUPPLY VOLTAGE: 230V - 6% +10% (50 - 60 Hz)

PROTECTION CLASS: IP41
 CONSTRUCTIONAL STANDARD: BS EN 61010 - 1

¹ Measured at power socket or external test clips.
² Power socket only.

SPECIFICATION

PROTECTIVE BONDING

TEST CURRENT:	≥10A into 0.33Ω
MEASURING RANGE:	0.05 - 5.00V
TEST THRESHOLDS:	1.0,1.4,1.9, 2.6, 3.3V

TEST CURRENT:	25A into S/C
MEASURING RANGE:	5mΩ - 0.5Ω
TEST THRESHOLDS:	0.10, 0.14, 0.19, 0.26, 0.33Ω

TEST VOLTAGE:	11V O/C @ supply Hz
ACCURACY:	± 10% ± 4 digits
METHOD:	4 WIRE (KELVIN)
TEST DURATION:	10, 20, 30, 60 SECONDS (10A) 25A LIMITED TO 10 SECONDS

INSULATION

TEST VOLTAGE:	≥500V DC @ 1 mA ¹
S/C CURRENT:	≤ 10.0 mA
MEASURING RANGE:	0.1 - 300 MΩ
TEST THRESHOLDS:	1.0 MΩ
ACCURACY:	± 8% ± 2 DIGIT UPTO 50 MΩ
TEST DURATION:	5, 10, 20, 60 SECONDS

VOLTAGE TEST

TEST VOLTAGE:	≥ 1000V O/C @ supply Hz ¹
TEST CURRENT:	> 0.5A
TEST THRESHOLD:	5, 10, 15, 20, 500mA
MEASURING INDICATION:	PASS / FAIL
TEST DURATION:	1, 2, 5, 10 SECONDS

TEST VOLTAGE:	> 2500V O/C @ supply Hz ²
TEST CURRENT:	20mA max
TEST THRESHOLD:	5, 10, 15, 20 mA
MEASURING INDICATION:	PASS / FAIL
TEST DURATION:	1, 2, 5, 10 SECONDS

¹ Available at power sockets or probe.

² Available at probe only.

Technical

After the operation tests described in the proceeding section the SEN60204 monitors the voltage remaining at the plug / terminals of the machine at the defined time after termination of machine power. The residual voltage rectifier is an average reading.

NOTE: When using the external residual volts drop monitor connectors, any direct power to the machine under test from the SEN60204 front panel connectors should be removed. When using a Three Phase Adaptor the SEN60204 applies power to the Three Phase Adaptor and not directly to the machine under test.

OPERATING PROCEDURES

- It is important for complete testing that the machinery is switched on for the duration of the test cycle.
- At the end of the leakage test a 'LOW LOAD, CHECK FUSE' warning may be given. If the machinery is known to be less than 50VA rating, the fuse may be found to be healthy and the test has been valid.
- It should be noted that the variety of machines on the market is such that it is unlikely that one default testing routine will satisfy all users, therefore if any doubt exists as to exactly which tests are to be performed on a specific machine, the manufacturer of the machine under test should be consulted for a definitive answer.

WARNINGS

- Do not touch the machinery while testing is in progress. A high voltage of 1.0kV/2.5KV is applied with respect to earth during voltage strength test, and 500V DC during insulation test.
- Ensure that the earth clip of the protective bonding test cable is securely attached to the machinery. A poor connection may introduce arcing of the contact.
- The machinery will be automatically energised during the Operation & Leakage test. Care should be taken that no ill effects can occur when the machinery commences operation.
- Certain machines may contain interference suppressors or other electronic components which may be damaged by the voltage test if their components are not rated to withstand this type of test. Under these conditions the standard allows for components to be temporarily disconnected.
- It is recommended that the SEN60204 is periodically checked by testing a machine of known electrical characteristics, or by using an approved check box.
- The instrument is designed to output a nominal 230V. It is extremely dangerous to connect 110V machinery to a 230V supply and this must **NEVER** be done under any circumstance.
- The side panels are fitted with quick release fasteners to allow access to test leads etc. Do not attempt to release any fasteners within the side enclosures.
- The measurement of protective bonding is taken from a PELV supply which is referenced to earth. When performing protective bonding measurements the user should ensure that the machine under test does not have any extraneous connections to earth. The existence of extraneous earth connections may invalidate the application of the designated test current between the specified points.

If multiple earth's are known to exist you have 3 options;

- * Remove all multiple earth paths.
 - * Use the point to point protective bonding test.
 - * Use a floating earth secondary mains isolation transformer (Seaward 219A927) to break the unwanted resistance loop.
- When using the probe to apply voltage test , take care to connect the probe to the correct panel socket. Both test voltage sockets are live when the voltage test is enabled.

GENERAL

If the SEN60204 has been unused for several months it is recommended that it be switched on for 16 hours before use to ensure the memory backup battery is in a healthy state of charge. Check memory for corruption and if in doubt clear memory before use. (See Step 23 and 24).

The SEN60204 is microprocessor controlled and is designed to be extremely user friendly by asking a series of questions which will guide the operator through the testing sequence.

At several points the operator is asked to make a selection from a number of options. The last selected option is presented as the first choice. Successive pressing of the NO key will cyclically present each of the other options. Pressing YES will activate that option.

The Hash (#) sign represents the confirm action - enter data command.

NOTE: No action will follow unless the hash (# / ENTER) key has been pressed.

At any time pressing the ABORT key will terminate the current operation.

PROCEDURE

STEP 1

Connect the keypad/display unit of the SEN60204 to the base using the supplied 25-way lead supplied. Connect the SEN60204 to the mains supply.

When connected to the mains the SEN60204 will display:

*SEAWARD MACHINERY
TESTER SEN60204*

The SEN60204 may display:

*VOLTS ON NEUTRAL
PRESS # ONLY IF SAFE*

This message is displayed if the supply live and neutral are reversed, or no earth is present. This message will also be shown if the SEN60204 is powered from a fully isolated supply. **ONLY PROCEED IF THE REASONS ARE KNOWN AND IT IS SAFE TO DO SO.** After a short period the SEN60204 will perform a memory test while displaying:

*SORTING MEMORY
>>>>>>*

After the memory test has been passed the SEN60204 will display:

PASS DATA CHECKSUM

MAINTENANCE

The SEN60204 is a rugged quality instrument, however care should be taken, failure to do so will reduce the instruments life and degrade its reliability.

- Always check all test leads for signs of damage prior to use.
- Keep the instrument clean and dry.
- Avoid testing in conditions of high electrostatic or electromagnetic fields.
- Check memory for corruption prior to each period of operation. If in doubt clear memory.
- No attempt should be made to gain access to the instrument while under test conditions.
- Maintenance should only be performed by an authorised person.

The SEN60204 contains no user replaceable parts.

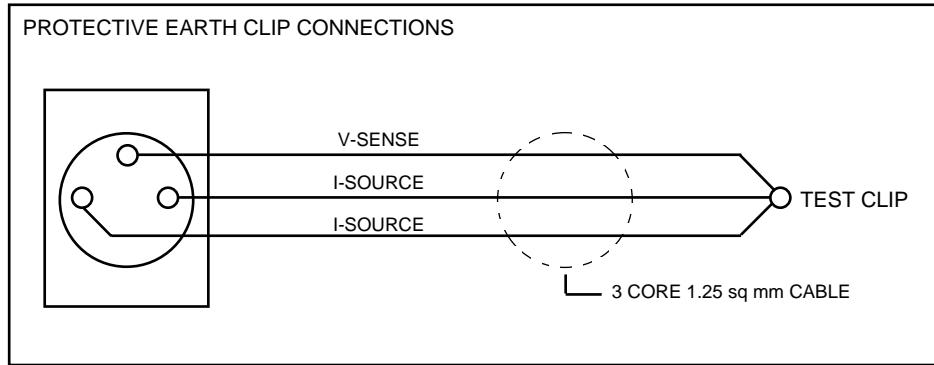
NOTE: the warranty excludes the internal rechargeable battery.

Should the SEN60204 require service, repair or calibration return the equipment to a recognised agent or to:

Seaward Electronic Limited
Bracken Hill,
South West Industrial Estate,
Peterlee,
County Durham,
SR8 2SW
U.K.

Tel: 44 (0) 191 586 3511
Fax: 44 (0) 191 586 0227

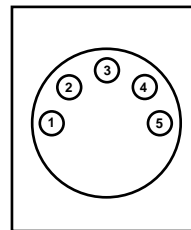
FRONT PANEL CONNECTIONS



VOLTAGE TEST SAFETY CONNECTIONS

PIN NO	SIGNAL
1	
2	
3	
4	Interlock
5	Interlock

FRONT PANEL VIEW OF FACILITY



If for any reason the unit does not display the PASS message, download the contents of the memory immediately and recharge the internal battery. (See Step 23).

STEP 2

The SEN60204 will then go on to display the last date entered by the operator:

IS THIS RIGHT Y/N
11 DEC 96 (11:12:96)

If the date is correct then simply answer yes by pressing either the 'YES' key or 'Y' key and go to Step 3. If the date is incorrect press either the 'NO' key or 'N' key. You will then be prompted to input the day number, to do this enter the day number and press '#' you will then be prompted to enter the month number, enter the month number and press '#', you will then be prompted to enter the year number, again enter the number and press '#'.

You will then be returned to the beginning of Step 2 with your new date displayed.

STEP 3

The SEN60204 will now display:

PRESS # FOR NEW TEST

From this position a number of options are available, these options allow the operator to dictate PASS/FAIL limits and access special functions of the SEN60204.

Use the following keys:

- # will proceed to Normal Testing Mode. (go to Step 4)
- D will proceed to Direct User Control. (go to Step 18)
- R will proceed to Remote Mode. (go to Step 19)
- S will proceed to Setup Mode. (go to Step 20)
- W will proceed to Bar Code Reader Set up. (go to Step 21)
- Z will proceed to Zero Earth Lead. (go to Step 22)
- SEND DATA will proceed to Data Output. (go to Step 23)
- CLEAR will proceed to Clear Memory routine. (go to Step 24)

STEP 4

The SEN60204 will now display:

INPUT TEST ITEM NUMBER
PRESS # OR USE THE WAND

you will then be asked:

INPUT TEST ITEM NUMBER
NO IS

Each item that you test must be assigned a unique name or number upto ten digits, this can be anything the operator chooses, for example a description or serial number. The unique name or number can be entered into the SEN60204 in two ways:

1. By using a Seaward Barcode Reader (SEAWARD 194A300) or a Seaward Scanner (SEAWARD 194A922) attached to the 'I/O PORT' the number can be entered by using barcode labels. These labels are also available from Seaward (SEAWARD 194A307).

2. The number can be entered using the alpha-numeric keypad with the following keys taking on special functions:

SEND DATA	is used as a spacebar
YES	is used as a fullstop
NO	is used as a minus sign
CLEAR	is used as a backspace for deleting errors

When you have entered the required number press # once to enter the number into memory.

The SEN60204 will then display:

IS THIS RIGHT? Y/N
NO IS

Press YES to proceed or NO to repeat Step 4.

STEP 5

The SEN60204 will then display

INPUT TEST CODE? Y/N

If you do not want to use Testcodes press 'NO' and proceed to STEP 6.

By using Testcodes the operator can save time by avoiding the requirement for repeated input of information. As with the item number the Testcode can be entered by using a barwand/barcode reader or by entering it direct using the keypad.

A full list of the options available under Testcode mode can be found in Table 3 (Page 22/23).

For example the following is valid:

2212111100

2	Plug, including Visual Inspection
2	1.5mm ² , set Protective Bonding PASS/FAIL limit to 0.26.
1	10A earth integrity
2	500V Insulation test
1	Insulation PASS/FAIL limit set to 2M.
1	1.0kV test voltage, 5mA trip level.
1	Perform Operations test.
1	Leakage PASS/FAIL set to 0.25mA.
0	No repeat tests.
0	30 sec Operational test, no repeat tests, internal Residual Decay sense.

If an option has been incorrectly entered the message 'INVALID TESTCODE' is displayed. Proceed to STEP 10 if Visual check is included or STEP 11 if Visual check is excluded.

STEP 6

The SEN60204 will now display either:

AUTOMATIC TEST? Y/N

or

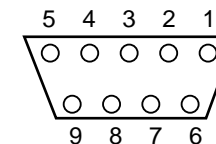
MANUAL TEST? Y/N

depending on which option was last selected. By pressing 'NO' the display will alternate between the two questions.

DATA I/O CONNECTIONS

A 9 pin 'D' type connector is located at the right hand end of the keypad.

The data output uses RS232 levels using $\pm 5VDC$.



Serial Data Connector

The pin connections are as follows:-

Pin 5,7 Ground, Earth

Pin 2 Busy/Data in

Pin 3 Data Out

Pin 1,4,6,8 NO connection

Pin 9 +5V (0.5A max)

The set-up data for computer/printer is as follows:

Baud rate 9600 for computer I/O, 1200 for printer output.

Start bits 1

Stop bits 2

Data bits 8

No parity

For a bar code reader the data set-up is as follows:

Baud rate 9600

Stop bits 2

Data bits 8

Inter-character delay 20ms

7	Functional test, pass limit selection
	0 = Omit Functional test 1 = Perform Functional Test
8	Earth Leakage test, pass limit selection
	0 = Omit Load and Earth leakage test unless digit 7=1 then 0.25mA 1 = 0.25mA 2 = 0.75mA 3 = 3.50mA 4 = 9.90mA (Top of range)
9	Repeat Selection
	0 = No repeat test 1 = Repeat Earth Integrity 2 = Repeat Earth Integrity and Insulation 3 = Repeat Earth Integrity and Flash 4 = Repeat Earth Integrity, Insulation and Flash 5 = Repeat Insulation 6 = Repeat Flash 7 = Repeat Insulation and Flash
10	Operation Duration - Repeat Test Sequence
	0 = 30 sec operation test, no repeat tests, internal residual decay sense 1 = 30 sec operation test, no repeat tests, external residual decay sense 2 = 30 sec operation test, repeat tests, internal residual decay sense 3 = 30 sec operation test, repeat tests, external residual decay sense 4 = 1 min operation test, no repeat tests, internal residual decay sense 5 = 1 min operation test, no repeat tests, external residual decay sense 6 = 1 min operation test, repeat tests, internal residual decay sense 7 = 1 min operation test, repeat tests, external residual decay sense 8 = 5 min operation test, no repeat tests, internal residual decay sense 9 = 5 min operation test, no repeat tests, external residual decay sense A = 5 min operation test, repeat tests, internal residual decay sense B = 5 min operation test, repeat tests, external residual decay sense C = 15 min operation test, no repeat tests, internal residual decay sense D = 15 min operation test, no repeat tests, external residual decay sense E = 15 min operation test, repeat tests, internal residual decay sense F = 15 min operation test, repeat tests, external residual decay sense

Table 3

The AUTOMATIC sequence will allow the tester to apply all of the tests once to the item under test. The user is only prompted for the Voltage and Functional tests.

The MANUAL sequence allows the operator to perform repeat tests. The SEN60204 can perform up to 30 Protective Bonding, 15 Insulation, 15 Voltage and 1 Functional test for each item under test.

Proceed by answering 'YES' to the option displayed.

STEP 7

The SEN60204 will now display either:

PERMANENT LEAD? Y/N

or

LEAD WITH PLUG? Y/N

depending which option was selected last. Again use the 'YES' and 'NO' keys to select the required option.

The PERMANENT LEAD option is used for equipment that is directly wired into a power source.

The LEAD WITH PLUG option is used for equipment with either a 13A or 16A plug.

STEP 8

The SEN60204 will now display either:

SINGLE PHASE Y/N

or

THREE PHASE Y/N

Again use the 'YES' and 'NO' keys to select the required option.

In SINGLE PHASE the Operation and Leakage test results are displayed.

In THREE PHASE the Operation and Leakage test results are not displayed, the SEN60204 expects a Three Phase Adaptor (SEAWARD 249A920) to be attached.

STEP 9

The SEN60204 will now display:

*SET PROTEC CONDUCTOR
AREA 1.0sq mm Y/N*

the area displayed will be one of the following options:
1.0sq mm, 1.5sq mm, 2.5sq mm, 4.0sq mm, 6.0sq mm

By pressing 'NO' the SEN60204 will cyclically present the options for the protective earth conductor cross sectional area. Pressing 'YES' will accept the option displayed.

STEP 10

The SEN60204 will now display:

VISUAL CHECK? Y/N

The SEN60204 is now asking if a Visual Inspection is to be performed. Pressing 'NO' will proceed to STEP 11. By pressing 'YES' you will be asked the following questions, simply answer 'YES' or 'NO' to each question.

IS CASE OK? Y/N
 IS LEAD OK? Y/N
 IS FUSE OK? Y/N

STEP 11

If you did not perform a Visual Check or answered 'YES' to all of the Visual Check questions then the SEN60204 will display:

CONNECT TEST ITEM
 PRESS # TO START

Press '#'.
 Press # to proceed.

STEP 12

In Manual mode and for a Test Code repeat test the SEN60204 will display:

PROTECTIVE BOND? Y/N

Pressing 'NO' will proceed to STEP 13.

If 'YES' is pressed then the SEN60204 will display:

P BOND
 PRESS # TO START

Connections

If the machine is connected to either 230V socket, the machine should be connected as Figure 2A (Page 30) ensuring that all connections are firmly made. The Protective Bonding Lead should be connected to a point of test which under normal operating circumstances should be earthed. A 'Point to Plug' test must be selected.

NOTE: When performing a 'Point to Plug' test take care that no alternative earth path exists. If they do, disconnect the alternative earth or use the 'Point to Point' test.

If the machine is connected directly via terminals, the machine should be connected as Figure 2B (Page 30) ensuring that all connections are firmly made. The Protective Bonding Lead should be connected to a point of test which under normal operating circumstances should be earthed. The Aux Protective Bonding Lead should be connected to the earthed terminal. A 'Point to Point' test must be selected.

NOTE: When performing a 'Point to Point' test there should be nothing attached to either 230V socket.

Press # to proceed.

In Manual, Automatic and Test Code modes the SEN60204 will then display:

POINT TO PLUG PROTEC
 BOND TEST Y/N

or

POINT TO POINT PROTE
 BOND TEST Y/N

Use the 'YES' and 'NO' keys to select the required option.

The SEN60204 will now perform a Protective Bonding test. Examples of the display follow for both 10A and 25A tests.

SEN60204 TEST CODE MENU

DIGIT POSITION	VALUE AND TEST
1	Power Termination / Visual inspection 1 = Terminals, including visual inspection 2 = Plug, including visual inspection 3 = Terminal, no visual inspection 4 = Plug, no visual inspection
2	Protective Conductor, conductor cross section selection 1 = 1.0mm ² - 0.33Ω 2 = 1.5mm ² - 0.26Ω 3 = 2.5mm ² - 0.19Ω 4 = 4.0mm ² - 0.14Ω 5 = 6.0mm ² - 0.10Ω
3	Earth integrity test, pass limit selection 0 = Omit Earth Integrity test 1 = 10A Earth Integrity 2 = 25A Earth Integrity
4	Insulation test voltage selection 0 = Omit insulation test 2 = 500V
5	Insulation test, pass limit 0 = Omit insulation test 1 = 2 Mohms 2 = 4 Mohms 3 = 7 Mohms 4 = 1 Mohms 5 = 0.5 Mohms
6	Voltage Test and pass limit selection 0 = Omit Flash test 1 = 1.0KV test voltage, 5mA trip level 2 = 1.0KV test voltage, 10mA trip level 3 = 1.0KV test voltage, 15mA trip level 4 = 1.0KV test voltage, 20mA trip level 5 = 1.0KV test voltage, 500mA (BURN) trip level 6 = 2.5KV test voltage, 5mA trip level 7 = 2.5KV test voltage, 10mA trip level 8 = 2.5KV test voltage, 15mA trip level 9 = 2.5KV test voltage, 20mA trip level

STEP 24

This option is to clear the contents of the SEN60204 memory.
The SEN60204 will display:

*CLEAR Memory, File or
Both? M,F,B or No*

- M will clear only the test results.
- F will clear only the test file uploaded from computer.
- B will clear both the test results and the test file.

The 10A test will display

*P BOND 10A a=2.5 5s
>0.5000Ω >5.00V FAIL*

The 25A test will display:

*P BOND 25A a=2.5 5s
>0.5000Ω FAIL*

The PASS/FAIL limits are defined by EN60204.1.20.2. (See Page 5, Table 1)

In Manual mode and Testcode mode where repeats for Protective Bonding have been selected, the unit will repeat STEP 12 until all 30 tests have been performed or the operator answers no to the 'PROTECTIVE BOND? Y/N' statement.

Remove the Protective Bonding Lead.

STEP 13

In Manual mode and for a Test Code repeat test the SEN60204 will display

INSULATION TEST? Y/N

Pressing 'NO' will proceed to STEP 14.

If 'YES' is pressed then the SEN60204 will display:

*INSULATION TEST
PRESS # TO START*

Connections

If the machine is connected to either 230V socket then the machine should be connected as Figure 3A (Page 31).

If the machine is connected directly via terminals, the machine should be connected as Figure 3B (Page 31). The earth of the machine should be connected to the GREEN socket, the Insulation test probe, which is connected to the RED 1 KV HV socket, should then be connected to each Live and Neutral for subsequent tests.

Press '#' to proceed.

An example screen is shown below of a Insulation test when started.

*INSULATION TEST 5s
>300 MΩ PASS*

The PASS/FAIL limits can be set up by the user in Testcode mode. In Manual and Automatic mode the default setting is 1MΩ.

In Manual mode and Testcode mode, where repeats for Insulation have been selected, the unit will repeat STEP 13 until all 15 tests have been performed or the operator answers no to the 'INSULATION TEST? Y/N' statement.

STEP 14

In Manual mode and for a Test Code repeat test the SEN60204 will display:

VOLTAGE TEST? Y/N

Pressing 'NO' will proceed to STEP 16.

If 'YES' is pressed then the SEN60204 will display:

*VOLTS TEST
PRESS # TO START*

Press '#' to proceed.

In Manual and Automatic Modes the SEN60204 will now display:

*VOLTS VOLTAGE 2.5kV
IS THIS RIGHT? Y/N*

or

*VOLTS VOLTAGE 1 kV
IS THIS RIGHT? Y/N*

Choose the option you require and press 'YES' to proceed.

If you selected '2.5kV' then proceed to STEP 15.

The SEN60204 will then display one of the following for the '1 kV' selection:

*VOLTS TEST, TRIP MODE
IS THIS RIGHT? Y/N*

or

*VOLTS TEST, BURN MODE
IS THIS RIGHT ?Y/N*

The 'BURN MODE' has a PASS/FAIL limit of 500mA while the PASS/FAIL limit for the 'TRIP MODE' is selected in Setup (see STEP 20). Press 'YES' to select the option displayed.

STEP 15

The SEN60204 will briefly display:

*TAKE CARE, BOTH HV
CONNECTORS ARE LIVE*

and then

*CONNECT TO 1kV
SOCKET, THEN PRESS #*

With the voltage displayed in the top right-hand corner.

Connections

Connect the Safety/Interlock key. If you are using a Three Phase Adaptor the Safety/Interlock key is built into the facility connector of the Three Phase Adaptor.

If the machine is connected to either 230V socket then the machine should be connected as Figure 3A (Page 31) ensuring that all connections are firmly made.

If the machine is connected directly via terminals, the machine should be connected as Figure 3B (Page 31). The earth of the machine should be connected to the GREEN socket, the Voltage test probe, which is connected to either the 1 KV or 2.5kV HV socket, should then be connected to each Live and Neutral for subsequent tests.

Press '#' to start the Voltage Test.

If the Safety/Interlock Key is missing or you are using the Seaward Flash Gun then the following message will be displayed:

SAFETY KEY MISSING

Enter the value noted.

NOTE: The SEN60204 subtracts the offset value from the measured value and displays the result. If the result should become negative the SEN60204 will display 0.000Ω.

The offset value is not maintained when the power to the SEN60204 is removed. At power up the offset value is always reset to 00mΩ.

STEP 23

The SEN60204 will display:

*READ STORED DATA
AS TEST CERT Y/N*

or

*READ STORED DATA
IN LIST FORMAT Y/N*

The 'TEST CERT' option will printout the results in the form of a calibration certificate (see page 34 for example printout).

The 'LIST FORMAT' option will printout the results in a format that is compatible with the Pats (SEAWARD 161A921) and Pats Plus (SEAWARD 161A922) computer software (see page 35 for example printout).

If you have selected the list format, the SEN60204 will display:

*READ STORED DATA
TO SERIAL PORT? Y/N*

or

*READ STORED DATA
DISPLAY ONLY? Y/N*

If you have selected 'TO SERIAL PORT' then the SEN60204 will display:

PRINTER OUTPUT? Y/N

or

COMPUTER OUTPUT Y/N

Printer output is at a baud rate of 1200 while Computer output is at a baud rate of 9600.

The SEN60204 will display:

SEND FROM START? Y/N

or

*SEND RESULTS OF LAST
TEST ONLY? Y/N*

or

INPUT TEST ITEM

This will allow you to print all of the tests, only the last test performed or an item number from where to start from.

If the option to send data to the SEN60204 LCD has been chosen, depressing the '#' key will move through each line of the test results, holding the key down will cause the display to rapidly through the test results.

The data will continue until all results have been displayed.

To exit this stage press the 'ABORT' key.

This option is to set the duration of the Protective Bonding Test, again use the 'YES' and 'NO' keys to select which option you require.
The options are; 10sec, 20sec, 30 sec and 1 min.

NOTE: This is invalid for 25A Protective Bonding Tests as this defaults to 10 seconds.

The SEN60204 will then prompt you for the duration of the Insulation Test.
The options are; 5sec, 10sec, 20sec, 1 min.

The SEN60204 will then prompt you for the duration of the Voltage Test.
The options are; 1sec, 2sec, 5sec, 10sec.

The SEN60204 will then prompt you for the duration of the Operation Test.
The options are; 30sec, 1min, 5min, 15min.

The SEN60204 will then prompt you for the PASS/FAIL level of the Voltage Test.
The options are; 5mA, 10mA, 15mA, 20mA.

The SEN60204 will then prompt you for the current for the Protective Bonding Test.
The options are; 10A, 25A.

The SEN60204 will then prompt you to select whether the sense for the Residual Volts Decay Test is Internal or External.
The options are; INT. VOLTS SENSOR, EXT. VOLTS SENSOR.

STEP 21

NOTE: This procedure is only required with HBCR 8300 series barcode readers. For other barcode readers check with the supplier.

At the prompt 'PRESS # FOR NEW TEST' plug the barcode reader into the I/O PORT on the Display/Keypad .

Press the 'W' key on the Keypad.

The SEN60204 will now automatically send the required codes the barcode reader setup and the barcode will now be configured.
Test the barcode reader on a suitable barcode for verification.

NOTE: This procedure is only applicable to older style readers. Later readers are supplied pre-configured by Seaward, or are supplied with barcode configuration sheet.

If the user wishes to use other barcode readers with the SEN60204, the reader should be programmed to set the inter-character delay to 20mS and to terminate the data with a CR character.

STEP 22

The SEN60204 incorporates a facility to compensate for the small residual resistance typically due to crocodile clip contact or wiring resistance in a Three Phase Adaptor.

The zero ohm facility will compensate for earth resistance <99mΩ.
To determine the compensation value, connect the earth bond main crocodile clip to the point of the machine under test that is considered the earth measurement point.

Using the DUC mode perform a Protective Bonding Test and note the resistance reading in mΩ

At the 'PRESS # FOR NEW TEST' prompt 'Z', the SEN60204 will display:

```
INPUT EARTH OFFSET
EARTH OFFSET (mΩ)
```

If you are using the Flash Gun then the SEN60204 is waiting for you to start the test by pressing the trigger. If you do not press the trigger of the Flash Gun within the time-out period or the Safety/Interlock Key is missing then you will be returned to STEP 14.

An example screen is shown below of a Voltage test when started.

```
VOLTS TEST 2.5kV 5s
(5mA MODE)
```

The PASS/FAIL limits can be setup by the user either by using Testcode mode or by using Setup mode (see STEP 20). The BURN test defaults to 500mA.

STEP 16

The SEN60204 will now display:

```
OPERATIONS TEST Y/N
```

Pressing 'NO' will proceed to STEP 17.

If 'YES' is pressed then the SEN60204 will display:

```
OPERATIONS TEST
PRESS # TO START
```

Connections

If the machine is connected to either 230V socket then the machine should be connected as Figure 4A (Page 32) ensuring that all connections are firmly made.

If the machine is connected using a Three Phase Adaptor then the machine should be connected as Figure 4B (Page 32) ensuring that all connections are firmly made. When using a Three Phase Adaptor the machine will be powered directly from a Three Phase supply. This should be connected to the input of the Three Phase Adaptor and will be switched by the SEN60204 through the Three Phase Adaptor when required. The SEN60204 will not indicate a reading when performing tests in this way.

Press '#' to proceed. The unit will then perform a Pre-load test, if the Pre-Load Test fails then the SEN60204 will display the following

```
LOAD WARNING! DO YOU
WANT TO GO ON Y/N
```

If you press 'NO' then proceed to STEP 17.

If the Pre-Load Test passed or you now press 'YES' then the SEN60204 will display

```
SKIP OPERATION? Y/N
(LEAKAGE TEST ONLY)
```

If you want the SEN60204 to perform just a Leakage Test then press 'YES'.

If you want the SEN60204 to perform an Operation Test and a Leakage Test then press 'NO'.

If an Operation Test has been selected then the SEN60204 will display the following example:

```
OPERATIONS TEST 30s
<0.05kVA PASS
```

The PASS/FAIL limit for the Operation test is set at 4kVA.

If an Operation Test has not been selected or the Operations Test has been completed then the SEN60204 will display the following example:

LEAKAGE TEST 5s
<0.30mA PASS

The PASS/FAIL limit for the Leakage can be setup by the user in Testcode mode. In Manual and Automatic mode the default is 3.50mA.

When the Leakage test has been completed the SEN60204 will display:

MACHINE SWITCHED OFF
,OBSERVING VOLTS NOW

Connections

If the machine is connected to either 230V socket, or through the Three Phase Adaptor then the machine should be connected as it was for the Operation and Leakage tests. The Residual Volts Decay will be measured when the supply voltage is terminated by the SEN60204. When using the SEN60204 in this way make sure that the sense for the Residual Volts Decay Test is set to Internal, this option is 'INT. VOLTS SENSOR' in Setup. (See STEP 20)

If the machine is connected directly via terminals, the machine should be connected as Figure 4C (Page 33). The Residual Volts Decay will be measured across terminals R1 and R2 when the supply voltage across terminals S1 and S2 is removed. For example look at Figure 4C, (Page 33) the Residual Volts Drop will be measured across the NEUTRAL and LIVE2 terminals when the voltage across the NEUTRAL and LIVE1 terminals is removed. When using the SEN60204 in this way make sure that the sense for the Residual Volts Decay Test is set to External, this option is 'EXT. VOLTS SENSOR' in Setup. (See STEP 20)

NOTE: Terminals R1 and R2 cannot be connected to the same place as S1 and S2 as this could give invalid readings.

NOTE: When using the external residual volts drop monitor connectors, any direct power to the machine under test from the SEN60204 front panel connectors should be removed. When using a Three Phase Adaptor the SEN60204 applies power to the Three Phase Adaptor and not directly to the machine under test.

When the Residual Volts Drop has been performed the SEN60204 will display the following example:

RESIDUAL VOLTS WAS
<60V at 1 sec PASS

The PASS/FAIL limit for the Residual Volts Decay is defined by EN60204.1.20.5. (See Page 7, Table 2).

If the result of the Operation test was less than 50VA then the SEN60204 will display the following

LOW LOAD! CHECK FUSE

STEP 17

When all of the tests have been completed the SEN60204 will indicate whether the tested item has passed or failed.

TEST COMPLETED PASS
INPUT USER CODE Y/N

The User Code is an option which allows a ten digit alpha-numeric to be entered. This can be used for a site or operator name. Press '#' when you have entered your text. Press 'YES' to proceed or 'NO' to re-enter your text.

The SEN60204 will then display

INPUT TEXT (1)? Y/N

The Input Text option allows four lines of text to be entered one line at a time. Again this text can be alpha-numeric and up to ten characters long.

By pressing 'NO' or completing the text messages the SEN60204 will display

DISCONNECT TEST ITEM
PRESS # TO CONTINUE

Press '#' to proceed to STEP 3.

STEP 18

In Direct User Control the SEN60204 will display the following:

1=^a 6.0, 10A ;2=P.BON
3=INS;4=VOLTS;5=OPER

From here the operator can access all of the tests available.

NOTE: While in this mode no data is stored into memory.

The options are as follows:

- 1 will select the Protective Conductor Area and currency cyclically.
- 2 will perform a Protective Bonding Test. (see STEP 12)
- 3 will perform an Insulation Test. (see STEP 13)
- 4 will perform a Voltage Test (see STEP 14)
- 5 will perform an Functional Test (see STEP 16)

ABORT will proceed to STEP 3.

STEP 19

The Remote mode is used when the SEN60204 is to be controlled from an external source via the I/O PORT.

The SEN60204 will remain in this mode until either the 'ABORT' key is pressed at the 'PRESS # FOR NEW TEST' prompt, or the controlling computer sends the equivalent sequence.

Removing the power to the SEN60204 will also reset control to normal operation.

STEP 20

The Setup mode is used to configure the way the SEN60204 will perform tests. The SEN60204 will display:

SET DURATION BON.
TEST TO 10sec? Y/N