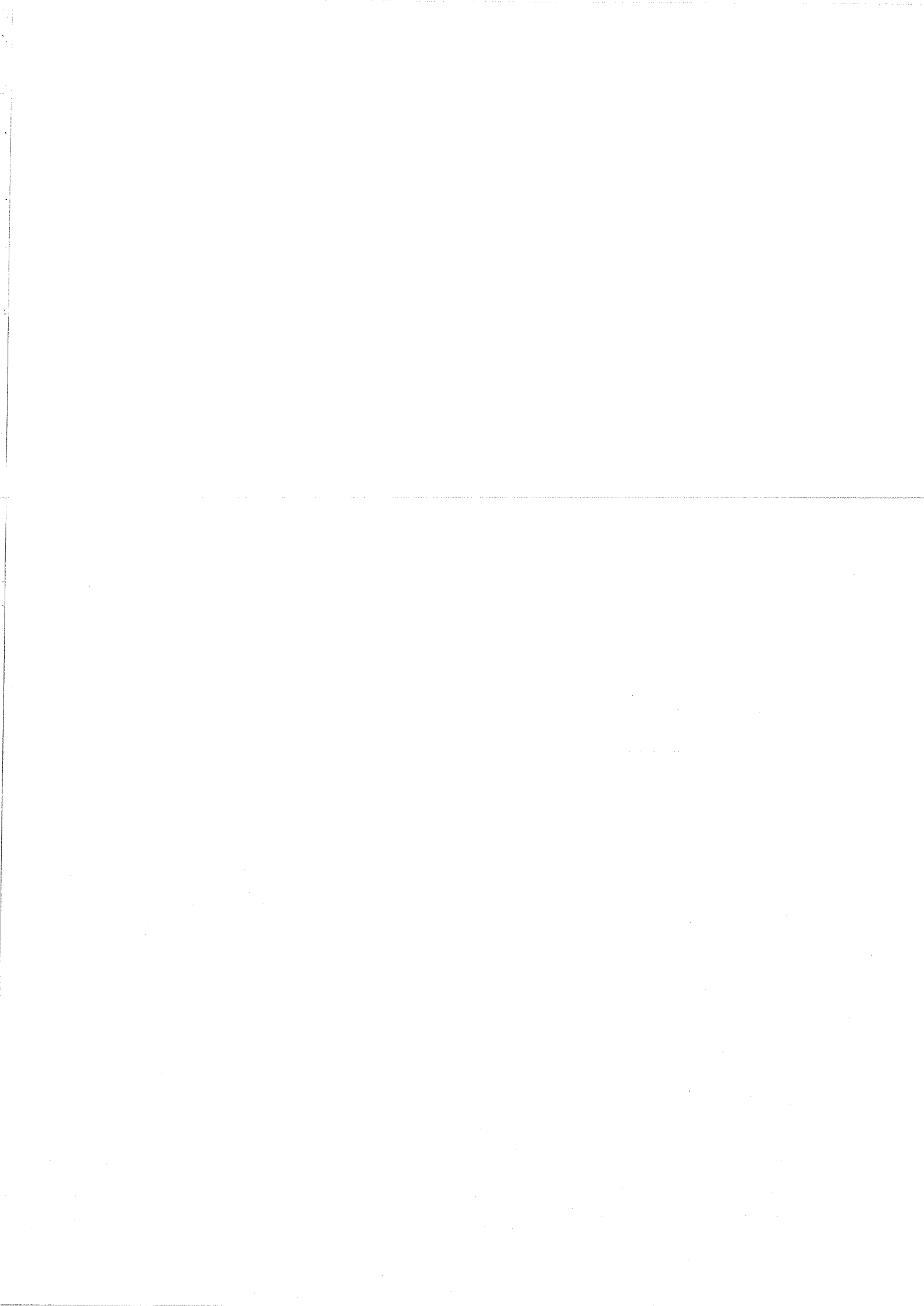




G102 / G103 Genius *Lite*
Advanced
Comprehensive Test Station
OPERATOR MANUAL





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Section 1 - Notices

Limited Warranty & Limitation of Liability

CLARE Instruments Limited guarantees this product for a period of 1 year. The period of warranty will come into effect on the day of delivery.

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E&OE

The information contained within this manual is given in good faith and is provided for guidance only. Although all reasonable care has been taken to ensure accuracy of the information, CLARE Instruments Limited, their agents and distributors, accept no responsibility for any errors or omissions within this document, nor for any misinterpretations by the user. For clarification on any part of this document please contact CLARE Instruments Limited, or your local agent, before operating the instrument.

Due to a policy of continuous development CLARE Instruments Limited reserve the right to alter or amend equipment specifications and descriptions outlined in this publication without prior notice. No part of this publication shall be deemed to form, or be part of, any contract for the equipment unless specifically referred to as an inclusion within such contract.

Declaration of Conformity

For the
Clare G102/103 – Genius Lite Test Station

Manufactured by:

Clare Instruments Ltd. Dominion Way Worthing, West Sussex. BN14 8NW

Millennium Statement

This product is Millennium compliant and conforms fully to the BSI DISC PD2000-1 document.

Statement of Conformity

Based on test results using appropriate standards, the product is in conformity with Electromagnetic Compatibility Directive 89/336/EEC and Low Voltage Directive 73/23/EEC.


Standards Used:

EN 61010-1 (1993) Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.

EN 50081-1 (1992) Electromagnetic Compatibility. Generic Emission Standard: EN55022 Class B.

EN 50082-1 (1992) Electromagnetic Compatibility. Generic Immunity Standard: IEC1000-4-2, -4-3, -4-4, -4-5.

The tests have been performed in a typical configuration.

Conformity is indicated by the symbol -  , for 'Conformité Européenne'

Section 2 - General Guidance Notes

SAFETY

The design of the Genius lite series of Advanced Comprehensive Test Stations meets the European Commission Directive No. 73/23/EEC, relating to the "Low Voltage Directive". This is in accordance with BS EN 61010-1: 1993 – Safety requirements for electrical equipment for measurement control, and laboratory use.

The design of the equipment is safe when used under the following conditions:

Indoor use;

Altitude up to 2000 m;

Temperature 5°C to 40°C;

Maximum relative humidity 80% for temperatures up to 31°C to 50% at 40°C;

Mains supply voltage fluctuations of $\pm 10\%$ of the nominal voltage.

The user **MUST** follow the remainder of this section on safety, installation, guidance and maintenance to guarantee safe operation and to maintain the equipment in a safe condition.

WARNING! Any interruption of the protective earth conductor (mains input earth) inside or outside the equipment is likely to make the equipment dangerous. The user must not intentionally interrupt the protective earth conductor.

When connected to the mains supply, internal terminals of the equipment may be live and the opening of covers or removal of parts is likely to expose live parts. The user must disconnect the equipment from **ALL** voltage sources before any adjustment, replacement, maintenance or repair.

F for plug top and 'Safebloc' output connectors. The user must not use makeshift fuses or short-circuit fuse holders.

The user should carry out manual handling of test equipment in accordance with regulatory guidance notes. That is those supplied by the Health & Safety Executive or Croner's and the Health & Safety at Work Act.

INSTALLATION AND USE OF TEST EQUIPMENT

Electrical safety tests (particularly Flash Tests) are required to comply with Legislative Documents on electrical and electronic product testing which may encroach the EMC (Electromagnetic Compatibility) requirements. This standard came into effect on 1st January 1996.

The design of the test equipment will minimise the effects of electromagnetic disturbances, but some interference may result from particular applications dependent on the type of product being tested.

Therefore, the user is responsible for installing and using the test equipment according to the manufacturers' instructions. The user of the test equipment is responsible for detecting electromagnetic disturbances and must resolve the situation with the technical assistance of the manufacturer. In some cases it may involve constructing an electromagnetic screen (Faraday cage) enclosing the test equipment and test pieces complete with associated input filters. The user should achieve a reduction in electromagnetic disturbances to a point where they are no longer troublesome.

ASSESSMENT OF TEST AREA

Before installing the test equipment the user shall make an assessment of potential electromagnetic disturbance problems in the surrounding area and take the following points into account -

- Supply cables (other than those supplying the test equipment), control cables, signalling and telephone cables. These can be above, below or adjacent to the test equipment.
- Radio and television transmitters and receivers within a distance of 30 metres;
- Computer and other control equipment within a distance of 10 metres;
- Safety critical equipment (i.e. the guarding of industrial machinery);
- The health of people in the surrounding area. Of approximately 2-3 metres (that is the use hearing aids, pacemakers, etc.);
- Delicate electronic equipment used for calibration or measurement.

The size of the surrounding area to be considered will depend on the overall structure of the building and other activities taking place. It is important to note that the surrounding area may well extend beyond the boundaries of the premises.

Position the equipment with adequate ventilation and easy access to all side of the equipment for maintenance purposes. Generally this means not enclosing the equipment (unless specifically designed so) or burying it under other test equipment.

Any person operating electrical test equipment should be 18 years or over and should have had adequate training in the use of the particular piece of equipment. The degree of training should be appropriate for the competence and experience of the operator.

Position the test equipment in a clearly defined test area with access limited to the operator only. Construct all test benches of insulated material, preferably wood. Use steel benches covered in insulating material under certain circumstances only.

The item under test must be on an insulated surface (where possible, as with large or unwieldy items this may not be possible).

DO NOT touch or come into contact with the instrument case or any other Earthed metalwork (for example conduit or metal trunking, etc.) whilst applying the safety tests. The operator should also be on an insulated surface such as British Standard approved rubber matting or nail free duckboard.

THE ITEM UNDER TEST MUST NOT BE TOUCHED WHILST THE FLASH TESTS ARE APPLIED

A supervisor should carry out the "Setting-up Procedure" before each shift to safeguard correct operation following the instructions supplied.

This instrument incorporates an ac and dc trip device that defaults to 5mA. The trip mechanism operates within 10 milliseconds to safeguard the operator and make the flash test non-lethal and non-destructive.

MAINTENANCE

Clare Instruments Ltd. supplies a guarantee against defective material and faulty manufacture for a twelve month period from the date of delivery.

Prior to despatch the equipment undergoes careful inspection and comprehensive testing. Report any defect discovered with the equipment in respect of materials or workmanship within the guarantee period. We undertake to put right the defect at our expense subject to our standard conditions of sale.

Our responsibility is in all cases limited to the cost of making good the defect in the equipment. This does not apply to defects caused by abnormal conditions of working, accident, misuse, neglect or wear and tear.

In the event of difficulty or apparent malfunction, it is advisable to contact Clare Instruments Ltd. On –

Telephone 01903 233314 or Fax 01903 216089.

E-mail: info@clareinstruments.com

Website: <http://www.clareinstruments.com>

We recommend that the complete instrument be returned to us for repair or re-calibration:

The Service Department
Clare Instruments Ltd
Dominion Way
Worthing
West Sussex
BN14 8NW

returning the instrument – if possible use the original packing box and supports.

Regularly calibrate all test equipment to meet internal quality or regulatory licensing authority requirements and to keep the equipment in a safe working condition. Return the equipment to Clare Instruments for this purpose.

Keep the equipment in a clean condition. Examine all input and test output leads and connectors regularly to guarantee they are in a safe working condition.

The equipment contains parts that are specific to the equipment only, therefore, order spare parts from the above address. Clare Instruments Ltd strictly forbid any use of spare parts, other than those acquired from the original manufacturer.

SUMMARY OF SAFETY INFORMATION

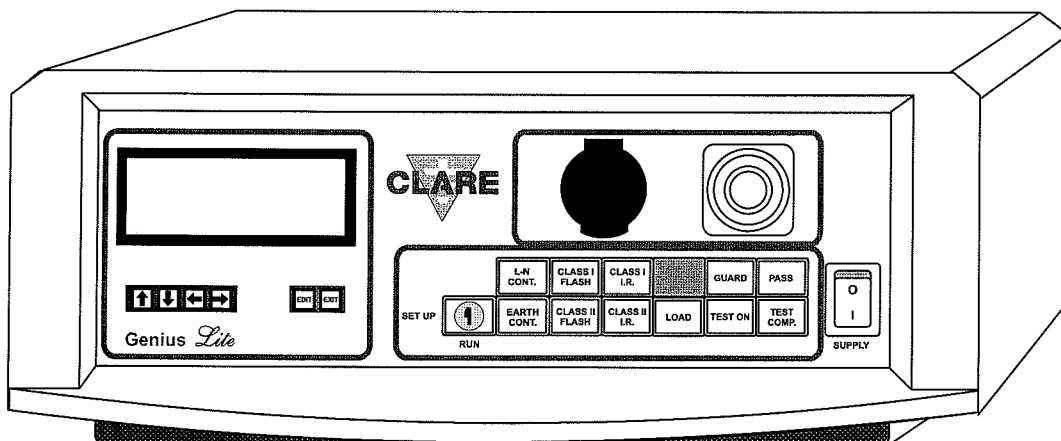
Should there be any doubt about location, setting up procedure or operation of the test equipment, contact Clare Instruments Ltd. Report any apparent malfunctions immediately.

Maintain the test equipment in accordance with Health and Safety at Work Act and the Electricity at Work Regulations. The supply socket used for connection to the incoming mains system should undergo earth loop impedance measurements in keeping with the regulations to guarantee safe operation.

PLEASE NOTE

Your Health and Safety Inspector may, with the benefit of on-site observations, offer alternate or additional instruction to the above recommendations.

Section 3 - Introducing the G102/G103



The G102/G103 Comprehensive Test Station.

This range of intelligent Electrical Safety testers provides the solution to many of today's complex and demanding product verification requirements.

systems.

FEATURES

Test Ranges

L-N Continuity
 Earth Continuity
 Flash 1 - LN-E at 0-5KV a.c. OR d.c.
 Flash 2 - LN-PROBE Flash Test at 0-5kV a.c. OR d.c.
 IR 1 - LN-E Insulation Resistance Measurement at 500V d.c.
 IR 2 - LN-PROBE Insulation Resistance Measurement at 500V.d.c.
 Load Test (G103) Run test with 0-15A ammeter

True RMS measurements

For optimum accuracy

Line and Load regulation

Compensates for supply voltage fluctuations

Programmable Trips

Variable PASS/FAIL set-points for each test

RS232 interface ports

For data download, I/O control for routing and printer output

Digital display

Large bright Vacuum Fluorescent Display – 4 lines x 20 characters

Controls and Indicators – G102.

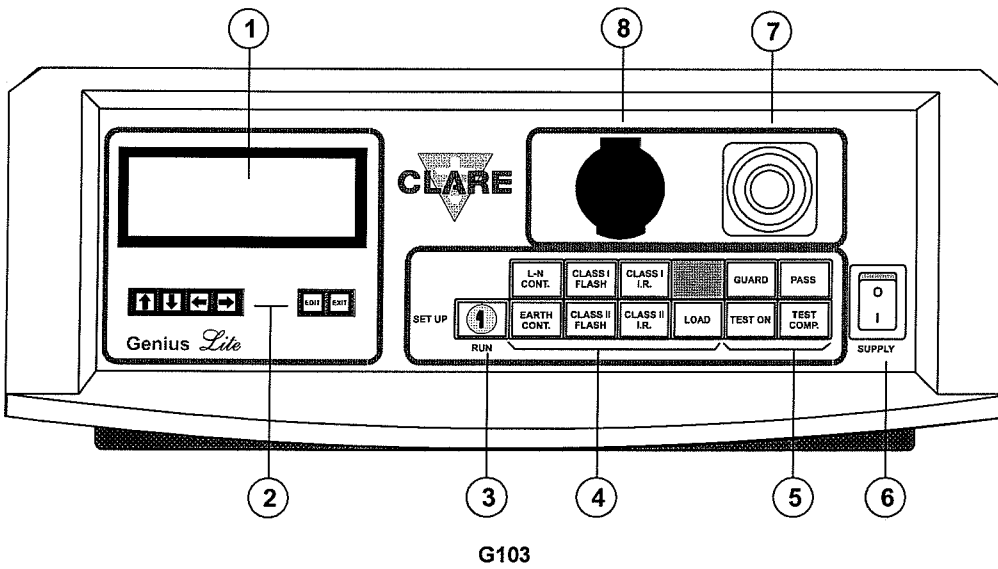
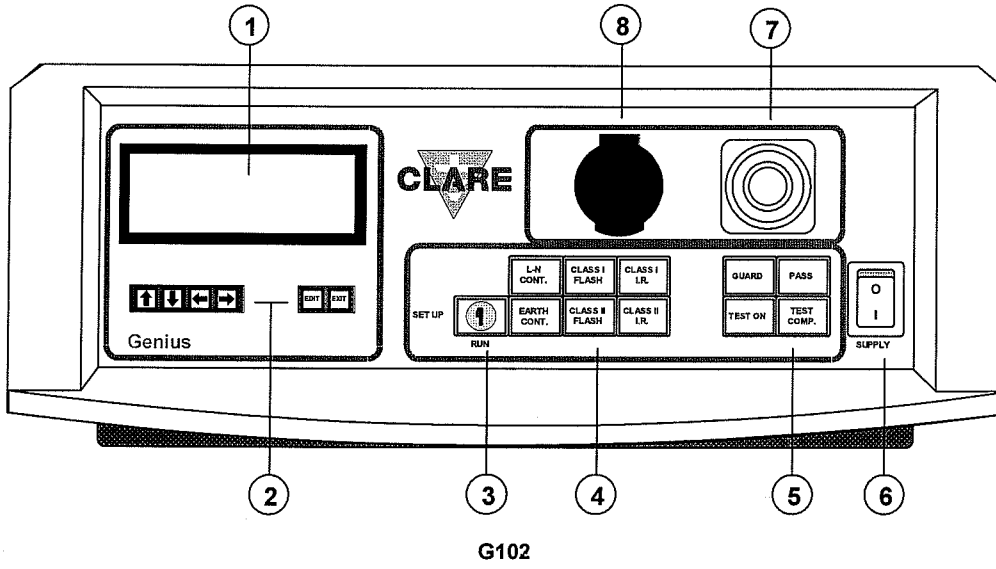


FIG 1 FRONT PANELS

Control Descriptions

1. Display Window – a 4 line by 20 character Vacuum Fluorescent Display. Displays test and set-up details and associated test progress/result messages.
2. Programming Keypad – used for navigating and editing system parameters.
3. RUN / SET-UP Keyswitch – used for supervisory security, key required to enter Set-up mode. In Run mode system parameters cannot be changed or edited.
4. FAULT lamps - highlight out of limit test results.
5. Status Indicators – used to show test progress. The TEST ON and TEST COMPLETE lamps cycle for each test in the selected sequence
6. Supply Switch – instrument ON / OFF switch. ON position indicated by visible red bar.
7. Earth Probe Socket – for no-burn Earth Probe or Earth Return clip lead. See fig.9 for details.
8. Flash Probe Socket – for safety probe when testing Class II appliances. May also be used as Test Output interface when instrument is connected to Safety Enclosure or other external system.

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Rear Panel Connections

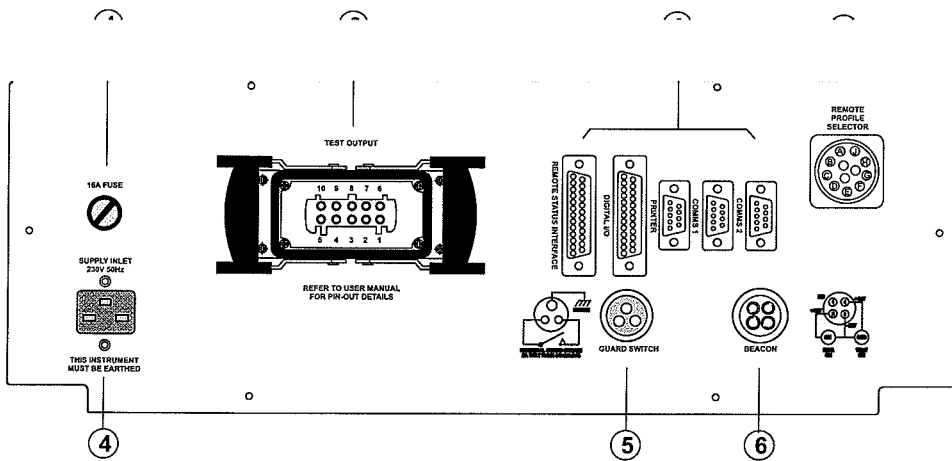


FIG.2 Rear Panel

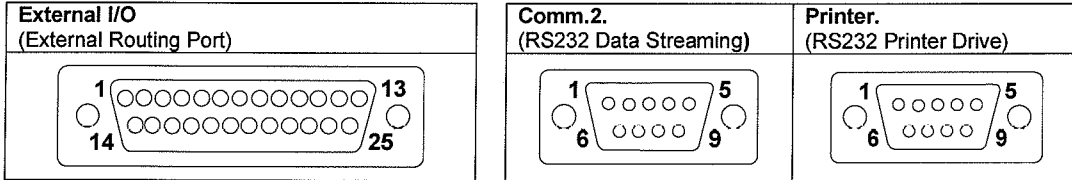
Component Descriptions

1. Fuse Holder – 5A(G102) 16A (G103) quick-blow fuse to ensure instrument protection even if supply inlet cable is un-fused. Replacement fuses must not exceed rating.
2. Test Output – Multiway socket for interfacing with Safety Enclosures, socket boxes and other user preferred devices for connecting item to be tested. See FIG.6 for pin-out details.
3. Interfacing Ports – Comm.1, Comm.2 and the Printer port provide RS232 outputs to external devices for downloading test result data. The Digital I/O port, for external routing systems, and the optional Isolated Status Indicator, for external monitoring of test Status/Pass-Fail conditions. See FIGs.3,7 & 8 for pin-out details, and page 35 for I.S.I.Applications.

4. **Supply Inlet** – an IEC 16A inlet for instrument supply – 230V 50Hz. The instrument must be Earthed (Grounded) for user protection.
5. **Guard / Safety Switch** – used to connect guard (lid) switch from Safety Enclosure or other external test initiation system. Switch contacts must be normally open and volt-free, closing to start. Contacts to be rated for 2A / 15Vd.c. See FIG.4 for connection diagram.
6. **Beacon** – output port for CLARE safety beacon - see FIG.5 for connection details – when connected the beacon will show a green light when the instrument supply is on and a red light when a test is in progress.
7. **Profile Selector Port** – an additional connector to allow Test Profiles 0-7 to be selected from an external source. See FIG.8 for pin-out details.

Interfacing Ports

FIG. 3 – RS232 Interface Port Connections and printer details



2	Dout 21	15	Din 13
3	Dout 22	16	Din 14
4	NC	17	Din 15
5	NC	18	Route 1 EC
6	Route 9 EC	19	Route 2 EC
7	Route 10 EC	20	Route 3 EC
8	Route 11 EC	21	Route 4 EC
9	Route 12 EC	22	Route 5 EC
10	Route 13 HT	23	Route 6 EC
11	Route 14 HT	24	Route 7 EC
12	Route 15 HT	25	Route 8 EC
13	Route 16 HT		

2	RX	2	Rx
3	TX	3	Tx
4	NC	4	NC
5	D/Ground	5	Digital Ground
6	NC	6	NC
7	NC	7	NC
8	NC	8	NC
9	NC	9	NC
Baud Rate	19200	Baud Rate	9600
Start Bits	1	Start Bits	1
Data Bits	8	Data Bits	8
Stop Bits	1	Stop Bits	1
Parity	None	Parity	None
Connection	3 wire	Connection	3 wire

N.B. NC= Not connected.
 Comm 1: Currently not configured (reserved).

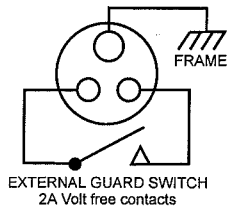


FIG.4 Guard / Safety Switch

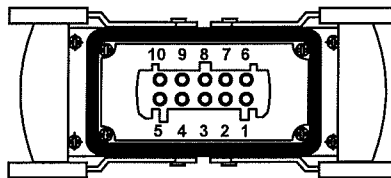


FIG.6 Test Output

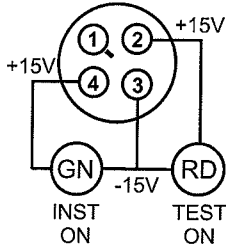
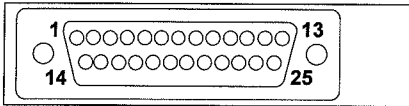


FIG.5 Beacon Connections

PIN	Description of outputs see Fig.6
1	To IUT Earth (HT cold)
2	NC – leave blank
3	To IUT Line (HT hot)
4	Reserved for future applications
5	To IUT Earth Return
6	E sense – to IUT Earth pin
7	NC – leave blank
8	To IUT Neutral (HT hot)
9	Reserved for future applications
10	E sense (return) – to IUT Earth pin

FIG.7 Isolated Status Indicator.



Test Status	Pins	
Guard Active	9	22
Test ON	10	23
Test COMPLETE	11	24
Test PASS	12	25

Individual Faults

Individual Faults	Pins	
	L-N Continuity	1
Earth Continuity	2	15
Flash 1 (LN - E))	3	16
Flash 2 (LN - Probe)	4	17
I R 1 (LN - E)	5	18
I R 2 (LN - Probe)	6	19
Load 240V	7	20

Isolated Status Indicator (ISI) option

The ISI option has been updated to include outputs for each individual fault condition, as well as Test On, Test Complete, Test Pass, Test Fail and Guard active signal.

These are electrically isolated switches which exhibit a high resistance in their off state and a very low resistance (typically 28 Ohms) in their on state. See page appendix 1 for I.S.I. applications.

FIG.8 Profile Selector Port

This connector allows Test Profiles 0-7 to be selected from an external device.

Input signal requirement – momentary action, volt-free, closing contact between pin A (common) and desired profile pin B-J (for profiles 0-7). A remote Profile Selector Box is available from Clare Instruments.

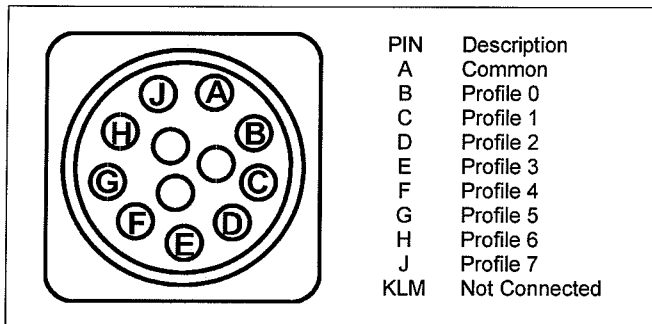


FIG.9 Earth return connection

Earth Return		External wiring to user supplied clip lead / test enclosure or other fixture	
PIN	Description	Cable Size (minimum)	
1	Earth Source 1	2.5mm ²	
2	Earth Sense	1.0mm ²	
3	Earth Source 2	2.5mm ²	
4-8	No external connection		

Lead length to be the minimum practical – with 2 metres maximum.
All 3 wires to be terminated and joined at test clip.

Supplied Accessories

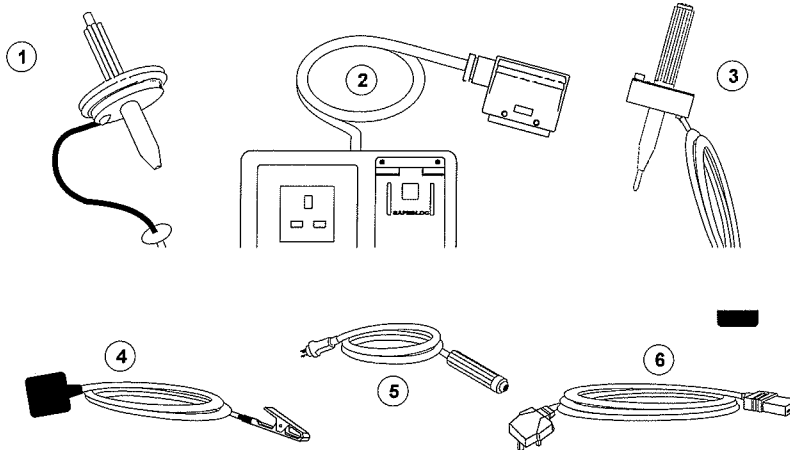


FIG.7 Supplied Accessories

- Flash Test Probe** – special safety probe for applying manual Class II Flash and Insulation tests. Plugs into front panel socket.
- Test Output Connector** – plugs into multiway socket to provide quick-connect device for products fitted with 13A BS1363 plug top or bare ended 2/3-wire mains supply cables. Other socket styles also available to order.
- No-Burn Earth Probe** – provides the Earth Return path and initiates the Earth Continuity test. – firmly apply the probe tip to the required test point on the exposed (Earthed) metal surface(s) of the item under test. Normally used where multiple earth points may require testing. Plug into Earth Return socket on front panel.
- Earth Return Clip Lead** – an alternative to item 3 above. Normally used where single point testing is sufficient for Earthing verification. Plug into Earth Return socket on front panel.
- NOTE** – the instrument self-checks the Earth Return socket to determine whether the Probe or Clip is connected and self-selects the appropriate test mode. When the EC probe is connected, the VFD window displays a 'P' in the upper right corner.
- Safety Switch** – used to control instrument safety circuit when test enclosure not being used.
- Supply Lead** – 13A plug top to 16A IEC connector. The supply to the instrument must be from a properly Earthed (Grounded) socket outlet.

Section 4 - Set-up Procedures

Instrument Set-up

BEFORE PROCEEDING ensure that the text prior to this point, especially with regard to safety, is fully understood.

Sight the instrument in accordance with the General Guidelines. Fit the supply cable into the 16A IEC supply inlet and connect the plug into an Earthed 230V 50 Hz socket outlet.

Set the mode keyswitch on the front panel (Fig.1-3) to the SET UP position and turn on the SUPPLY switch (Fig.1-6). Observe the digital display panel, a 'boot up' message will appear briefly –

<p>GENIUS G102 ELECTRICAL SAFETY TEST STATION VX.X</p>	<p>Followed by the initial Set Up menu selector -</p>	<p>SETUP MENU Test Profile (↓) Batch Details (←) System Setup (→)</p>
---	---	--

The 'arrows' against each menu item represent the arrow keys (FIG.1-2) beneath the display window, pressing the appropriate arrow key will access the selected menu item and bring up further relevant displays.

NOTE System Set-Up is to set up a printer. The Clare recommended option is the TSP400 thermal label printer. (PLS001)plus lead.

Test Profiles

TEST PROFILE 0
Change current (↓)
Modify current (←)
Auto configure (→)

NOTE the 'Auto configure' option is not enabled at present – please ignore.

Change current (↓) – allows selection of the required Profile using the up / down arrow keys. A total of 10 Profiles (0-9) can be configured, to provide dedicated test sequences for different products types or ranges.

TEST PROFILE 0
To change use (↑↓)

When the required Profile number is displayed, depress the EXIT key to lock the selection and return to the previous window.

Modify current (←) – opens the currently selected Profile for viewing / editing. Each profile has 20 test stages (0-19), each of which can be set as any one of eight test types, L-N Continuity, Earth Continuity, F1 (LN-E Flash Test), F2 (LN-Probe Flash Test), IR1 (LN-E Insulation measurement), IR2 (LN-Probe Insulation measurement), Load 230 or 'none'.

TEST PROFILE 0
Test NN: TEST TYPE
To view tests (↑↓)

Use the up and down arrow keys (↑) (↓) to scroll through the tests (00-19) and display the test type for each.

To change a test type, scroll to the relevant test number from the display above, then depress the EDIT key to bring up the next display –

<p>TEST PROFILE 0</p> <p>Test NN: TEST TYPE</p> <p>To change test (↑↓)</p>
--

Now use the up and down arrow keys (↑) (↓) to scroll through the available test types and select the one required. When satisfied depress the EXIT key to return to the 'view' display.

Test Type Descriptions

L-N Continuity - a low voltage test to check that the item being tested is correctly connected and switched ON. Acceptance limits can be set for both upper and lower values. Suitable for Class 1 and Class 2 appliances.

Earth Continuity - also referred to as an Earth Bond test, used to measure the integrity of the Earth circuit. This test applies a constant current through the Earth path and measures the resultant millivolt drop or milliohms of resistance. The test current can be set between 10-25A and a Test Pass limit can be set between 0-5000 millivolts OR 0-500 milliohms. Used for Class 1 (Earthed) appliances only.

F1 – LN-E Flash Test - a high voltage withstand test to check that there is no breakdown (or flash-over) between the Line/Neutral and Earth paths. The test voltage can be set between 0-5000V AC or DC and an associated mA Leakage Trip can be set between 1-10mA a.c. or 1-5mA d.c. For Class 1 Earthed appliances only.

IR1 - LN-E Insulation Resistance test - a fixed, 500V d.c., test to measure the Insulation Resistance between the Line/Neutral and Earth paths. Pass limits can be set between 1-49.9 Megohms. For Class 1 Earthed appliances only.

F2 – LN-Probe Flash Test - a high voltage withstand test to check that there is no breakdown (or flash-over) between the Line/Neutral circuits and outer surfaces of the product under test. The test voltage can be set between 0-5000V AC or DC and an associated mA Leakage Trip can be set between 1-10mA a.c. or 1-5mA d.c. For Class 2 Double Insulated appliances only.

IR2 - LN-Probe Insulation Resistance – a, fixed, 500V d.c. test to measure the Insulation Resistance between the Line/Neutral paths and outer surfaces. Pass limits can be set between 1-49.9 Megohms. For Class 2 Double Insulated appliances only.

LOAD 240V (G102) - A fixed voltage Run or Function test to ensure the product is operating within the intended

When setting-up Profile sequences it is advisable that Safety Tests are applied BEFORE a Load (Run) test and that L-N and/or Earth Continuity Tests are applied before Flash or Insulation tests.

When setting-up Profile sequences it is advisable that L-N and/or Earth Continuity Tests are applied BEFORE Flash or Insulation tests.

Test Parameters

To view or edit the test and measurement parameters associated with a selected test, depress the EDIT key (twice from the 'View tests' display or once from the 'Change test' display) to bring up the Parameter Window.

TITLE	1	SELECTION
Vt:	2	Tu: 3
Lu:	6	Th: 4
Ll:	7	Td: 5

Each parameter window has a test title and fixed or editable data in a series of 'fields', which are laid out in a set pattern common to all parameter windows. Only fields relevant to a test will be visible. In the illustration the fields are numbered in the order in which they are accessed using the RIGHT arrow key (→) to scroll through them.

Descriptions of the various fields are given next.

Parameter Window Fields

Field 1:

Used for selecting various test specific options that will be shown alongside, such as AC or DC for a Flash Test, mΩ or mV measurement for an Earth test, etc.

Field 2 – At / Vt:

Used to set and display the stored test current (At) or test voltage (Vt). For some tests this value may be fixed and non-editable. Current is displayed in the form 000.0 Amps and voltage as 0.000 kV (kilovolts).

Field 3 – Tu:

Ramp UP time, for applied flash test voltage. Minimum setting 1.0 seconds.

Field 4 – Th:

Ramp HOLD time, for applied flash test OR test ON time for all other tests. When set to 0 (zero) the related test will be disabled and unavailable in Manual mode or by-passed in the Auto test sequences.

Field 5 – Td:

Ramp DOWN time, for applied flash test voltage. Minimum setting 0.5 seconds.

Field 6 – Lu:

UPPER set point limit for related test. Units will depend on test.

Field 7 – LI:

LOWER set point limit for related test if applicable.

Typical Parameter Settings

A. Line to Neutral Continuity

Shown with lower limit (LI) only of 250 ohms and test duration (Th) of 1 sec. Test voltage not

B. Earth Circuit Continuity

Shown with a test current (It) of 25Amps, an upper limit (Lu) of 100 milliohms and a test duration

C. Class 1 Flash Test

Set for an AC test voltage (Vt) of 1,250 with an upper limit (Lu) of 5mA of leakage and a ramp

L-N CONT 0	1L=0/2L=1
LI: 250.0	Tu: 1.0

EC CONT 0	mΩ=0/mV=1
It: 25.0	Lu: 100
Th: 2.0	

F1	0	AC=0/DC=1
Vt: 1.250	Tu: 1.0	
Lu: 5.0	Th: 1.0	
	Td: 1.0	

D. Class 1 Insulation

Shown with lower limit (LI) only of 2 Megohms and test duration (Th) of 1 sec. Test voltage (Vt) is not selectable for editing at present.

E. Class 2 Flash Test

Set for an DC test voltage (Vt) of 4400 with an upper limit (Lu) of 1mA of leakage and a ramp profile of 2 sec. / segment.

F. Class 2 Insulation

Shown with lower limit (LI) only of 7 Megohms and test duration (Th) of 2 sec. Test voltage (Vt) is not selectable for editing at present.

IR1		
Vt: 0.500	TH: 1.0	
LI: 2.0		

F2	1	AC=0/DC=1
Vt: 4.400	Tu: 2.0	
Lu: 1.0	Th: 2.0	
	Td: 2.0	

IR2		
Vt: 0.500	Th: 2.0	
LI: 7.0		

Editing Test Parameters

1. Use the RIGHT arrow key (→) to navigate through the editable fields, as each field is selected the cursor will highlight the right hand digit – only those fields that can be edited can be accessed, non-editable fields will be skipped over.
2. When the desired field is selected press the EDIT key to 'open' the field – all field digits will be visible including leading zeros.
3. Use the RIGHT arrow key (→) to scroll along the field and select individual digits.
4. Use the UP and DOWN arrow keys (↑ ↓) to change the value of the selected digit.

5. When satisfied with the value of each digit in the field, press the **EDIT** key to store the new field value.
6. Check that the field value is as intended - most editable field values are limited to certain value ranges dependent on both the field and the applicable test. If out of limit values are entered, when the **EDIT** button is pressed the upper or lower limit value will be reverted to.
7. To select and edit another field, repeat steps 1 to 6 above.
8. To return to the main Set-Up Menu press the **EXIT** key.

Batch details

This main **SET-UP** menu option, accessed by pressing the **LEFT** arrow key (**←**), provides an entry point for additional data which can be stored along with test results.

Batch ID:	00000
Quantity:	00000
Start No:	00000
Cal: DD/MM/YY	HH:MM

These fields can be edited in a similar manner to that described under 'Editing Parameters' above.

Batch ID – this can be a number from 0 to 50000 and is only intended as a cross-reference to any specific

number from 0 to 9999, when the set number is reached a **BATCH COMPLETE** message is displayed.

Start Number – this field allows similar products to be tested under the same Batch ID but at different times and still maintain sequential numbering.

Calendar – allows date & time data to be added to stored test results. Once set, the RTC is normally battery maintained.

When details are as required press the **EXIT** key to return to the main menu.

Section 5 - Test Application

General Information

As a versatile comprehensive test station, the G102/G102 can be used in a number of ways for checking and measuring the various electrical parameters associated with product safety. The instrument is suitable for use in the Laboratory, the Repair Shop and on the Production Line.

Wherever and however the instrument is to be used, certain common sense safety precautions **MUST** be observed before attempting to use this instrument – refer to the General Guidance Notes with particular emphasis on -

Operator Competence Siting and Access to the Test Area

and, most importantly, remember to

ENSURE THAT THE ITEM BEING TESTED CANNOT BE TOUCHED

Optimum safety can best be achieved by using a Safety Enclosure with incorporated Guard Interlock switching. This can then be connected into the test instrument's Safety circuit to fully isolate potentially hazardous outputs whenever the guard/lid is opened.

This Safety circuit can also be controlled by the remote Safety Switch supplied with the instrument or any other suitable switching device.

For the purposes of this manual, references to closing or opening the Guard can be taken to equally refer to other remote Safety switch devices. No tests can be applied until the device is closed - the panel mounted **GUARD** lamp will glow when the Safety circuit is activated (closed).

relevant test parameters.

Determine which test leads will be required –

Test Output Lead – plug into rear panel connector, this will be required for all modes to connect the appliance supply lead or power cord.

Earth Return Clip Lead – plug into front panel connector, this is required for Class 1 products where testing to a single Earth point will be sufficient.

Earth Return Probe – plug into front panel connector, required for Class 1 products where testing to multiple Earth test points may be necessary.

Note: the instrument automatically senses which Earth Return device is connected and adjusts the test routine accordingly.

Flash Test Probe - plug into red front panel connector, only required for manual mode testing of Class 2 products where Flash and Insulation tests are applied to outer surfaces. Where Safety enclosures are used, a conductive foam nest would normally be incorporated to envelop the Class 2 product and the Probe output socket would be hardwired to the nest material.

OPEN the Guard/Safety switch. Set the mode keyswitch to the **RUN** position – the selected Test Profile and all set parameters are now locked and cannot be altered until the Set-Up mode is again selected. For safety and security purposes, the key is removable in this Run position.

Class 1 Flash Test

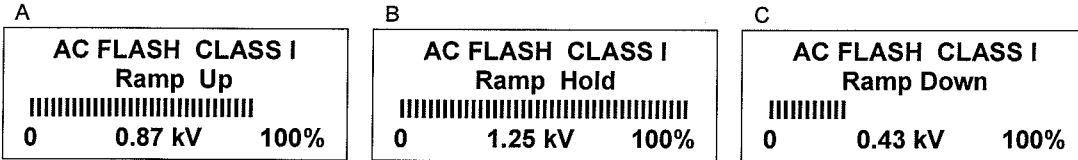
Power cord connection only - no additional test connections required. Place the item on an insulated surface.

WARNING : FLASH TESTING IS HAZARDOUS - DO NOT TOUCH THE ITEM WHEN UNDER TEST

CLOSE the Guard / Safety switch to start the test – the panel mounted GUARD lamp will glow.

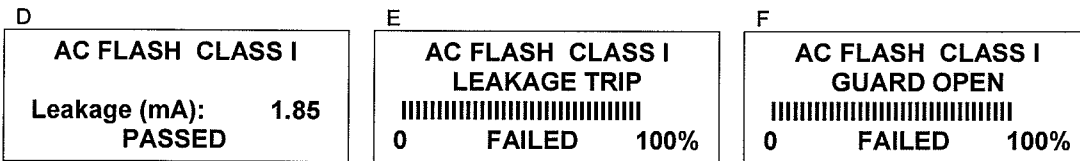
Lamp Display - the TEST ON lamp will glow for the test duration, followed by the TEST COMP. (complete) lamp plus either the PASS lamp, for a satisfactory test, or the red CLASS I FLASH fault lamp, to show an insulation breakdown (flash-over) or an out of limit leakage current.

VFD Display - the VFD will also show test progress with a bar graph representation of the lapsed time (0-100% of set time) as the voltage ramps up, holds and ramps down. See displays A-C below



Note: the title line will read AC FLASH or DC FLASH dependent on set parameters.

At the end of the test, result displays, with appropriate text messages, will again remain on until the Guard is released. A satisfactory test will be indicated by the PASSED display (D) and a fault condition, such as an insulation breakdown or Leakage Current in excess of the set limit, will bring up the FAILED message (E).



Class 2 Flash Test

Connect the red Safety Probe into the front panel socket and apply the probe tip to the test point on the outer surface of the item under test.

CLOSE the Guard / Safety switch – the panel mounted GUARD lamp will glow. Momentarily depress (i.e. press & release) the CLASS II FLASH button to start the test.

Lamp and VFD Displays – generally as for Class 1.

Repeat the test for other test points or set the Test Hold time to maximum so that the probe can be applied at various test points during the Hold part of the ramp cycle. A fault at any test point will stop the test.

Class 1 Insulation Test

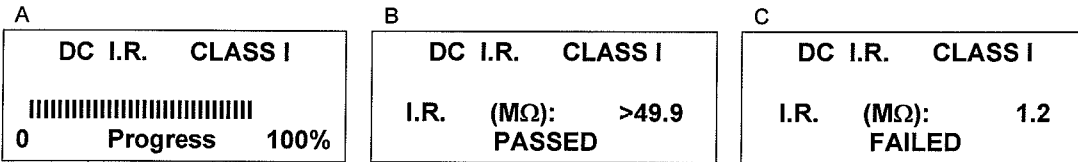
Power cord connection only - no additional test connections required. Place the item on an insulated surface.

CLOSE the Guard / Safety switch to start the test – the panel mounted GUARD lamp will glow.

Lamp Display - the TEST ON lamp will glow for the test duration, followed by the TEST COMP. (complete) lamp plus either the PASS lamp, for a satisfactory test, or the red CLASS I I.R. fault lamp, to show an insulation breakdown (flash-over) or an out of limit leakage current.

VFD Display - the VFD will also show test progress and results with appropriate text messages together with a bar graph representation of the lapsed time (0-100% of set time). See display A below

A satisfactory test will be indicated by the PASSED display (B) showing the measured value – if the measured value falls outside the preset limits the FAILED message (C) will be displayed.



Lamp and VFD result displays will remain on until the Guard is released.

As with a Class 2 Flash Test the only difference between Class 1 and Class 2 Insulation Tests is the method of test application and, as a rule, different Pass/Fail limits.

Connect the red Safety Probe into the front panel socket and apply the probe tip to the test point on the outer surface of the item under test.

CLOSE the Guard / Safety switch to start the test – the panel mounted GUARD lamp will glow.

Lamp and VFD Displays – generally as for Class 1.

Repeat the test for other test points or set the Test Hold time to maximum so that the probe can be applied at various test points during the test cycle. A fault at any test point will stop the test.

Load 230V Test

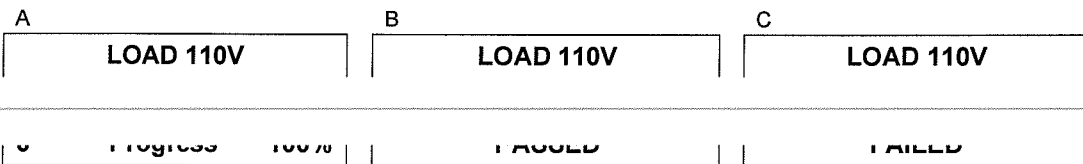
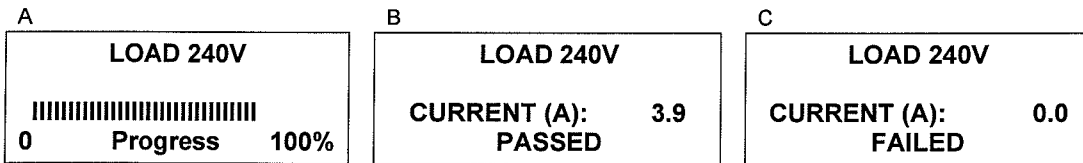
Power cord connection only - no additional test connections required. Place the item on an insulated surface and ensure that it cannot move about or cause any hazard when it starts up.

CLOSE the Guard / Safety switch to start the test – the panel mounted GUARD lamp will glow.

Lamp Display - The TEST ON lamp will glow for the test duration, followed by the TEST COMP. (complete) lamp plus either the PASS lamp, for a satisfactory test, or the red LOAD fault lamp, to show an out of limit run current.

VFD Display - The VFD will also show test progress and results with appropriate text messages together with a bar graph representation of the lapsed time (0-100% of set time). See display A below:

A satisfactory test will be indicated by the PASSED display (B) showing the measured value – if the measured value falls outside the preset limits the FAILED message (C) will be displayed.



Lamp and VFD result displays will remain on until the guard is released.

Auto Profile – Class 1 Appliances

For the purposes of this manual it will be assumed that -

- A Safety Test Enclosure is being employed whilst carrying out the auto sequence.
- The Class 1 sequence will include L-N Continuity, Earth Continuity and LN-E Flash and IR tests.

Open the enclosure and set the keyswitch to the RUN position, the VFD window will show the following message

<p>PROFILE 1 BSN: 00001 IN: 0001 To initiate new test Close safety guard</p>
--

< batch data only shown if set-up originally

Single Point Earth Testing

Load and connect an appliance or product to be tested – connect the appliance power cord into the Test Output connector and clip the Earth Return lead to exposed Earthed metal on the appliance.

Ensure all switches on the appliance under test are set to the ON position. When ready, shut the Test Enclosure

Lamp Display - the panel mounted GUARD lamp will come on followed by the TEST ON lamp as the first test, (L-N Continuity), is applied. Then as each test times out, TEST ON goes off and TEST COMP. comes on repeating until all tests are complete. at which time the PASS lamp will light. A test FAIL will halt the test sequence and light

Multi-point Earth Testing

Some applications, even in the production line environment, may require Earth Continuity (EC) to be checked at various test points.

To provide this capability the Genius Lite is supplied with a 'no-burn' safety probe. Whenever this probe is connected to the instrument and multiple EC tests are programmed into the Profile, the sequence will pause before each EC test and display message below. The guard can be opened whilst EC tests are applied by probe.

<p>EC TEST P</p> <p>APPLY EC PROBE To test point</p>
--

The test will run and give the usual Displays – if satisfactory the green lamp on the probe will light and the next message will be displayed

<p>EC TEST P</p> <p>Release EC PROBE</p>
--

When satisfactory results have been obtained at all Earth tests specified in the Profile, the message display will prompt for the Guard to be closed to continue the remaining tests in the profile.

If an unsatisfactory result is achieved at ANY of the Earth test points, the relevant FAILED message and lamp indication will be displayed and the sequence will be abandoned.

Auto Profile – Class II Appliances

For the purposes of this manual it will be assumed that -

- A Safety Test Enclosure is being employed whilst carrying out the auto sequence.
- The outer surfaces of the appliance are enveloped in a conductive foam nest.
- The Class II sequence will include L-N Continuity plus LN – Outer Surfaces Flash and IR tests.

Open the enclosure and set the keyswitch to the RUN position, the VFD window will show the following message

PROFILE N
BSN: 00001 IN: 0001
To initiate new test
Close safety guard

Load and connect an appliance or product to be tested.
 Ensure all switches on the appliance under test are set to the ON position.
 When ready, shut the Test Enclosure

Lamp Display - the panel mounted GUARD lamp will come on followed by the TEST ON lamp as the first test, (L-N Continuity), is applied. Then as each test times out, TEST ON goes off and TEST COMP. comes on, repeating until all tests are complete, at which time the PASS lamp will light. A test FAIL will halt the test sequence and light the appropriate red fault lamp. The PASS or FAIL lamps will remain on until the enclosure/guard is opened.

VFD Display – as each test is applied, the relevant progress/result screens (A-H) will be displayed. At the end of the test sequence, the message of screen 'I' will be displayed and the system waits for operator action

<p>A></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">L-N Continuity</p> <p> Progress 100%</p> <p>0</p> </div>	<p>B></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">L-N Continuity</p> <p>Cont. (mΩ): 123.5</p> <p style="text-align: center;">PASSED</p> </div>		
<p>C></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">AC FLASH CLASS II Ramp Up</p> <p> 0.87 kV 100%</p> <p>0</p> </div>	<p>D></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">AC FLASH CLASS II Ramp Hold</p> <p> 1.25 kV 100%</p> <p>0</p> </div>	<p>E></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">AC FLASH CLASS II Ramp Down</p> <p> 0.43 kV 100%</p> <p>0</p> </div>	<p>F></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">AC FLASH CLASS II</p> <p>Leakage (mA): 1.85</p> <p style="text-align: center;">PASSED</p> </div>
<p>G></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">DC I.R. CLASS II</p> <p> Progress 100%</p> <p>0</p> </div>	<p>H></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">DC I.R. CLASS II</p> <p>I.R. (MΩ): >49.9</p> <p style="text-align: center;">PASSED</p> </div>	<p>I></p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">RUN MODE 1</p> <p>BSN: 00001 IN: 0002</p> <p style="text-align: center;">Release safety guard</p> <p style="text-align: center;">To clear last test</p> </div>	

Note the incremented IN (item number) in the Batch detail line. When this value reaches the preset Batch Quantity a BATCH COMPLETE message will flash up on the display and no further testing can be carried out until batch parameters are altered via the Set-Up routine – i.e. a new BSN (batch Serial No.) is entered or the quantity required is increased.

VFD Display – as each test is applied, the relevant progress/result screens (A-J) will be displayed. Prior to the Load test, operator action will be required to ensure the product will be safe when powered up – see message K. At the end of the test sequence, the message of screen K will be displayed and the system waits for operator action.

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<p>A></p> <p>L-N Continuity</p> <p> </p> <p>0 Progress 100%</p>	<p>B></p> <p>L-N Continuity</p> <p>Cont. (mΩ): 123.5</p> <p>PASSED</p>	<p>C></p> <p>EC Continuity</p> <p> </p> <p>0 Progress 100%</p>	<p>D></p> <p>EC Continuity</p> <p>Cont. (mΩ): 123.5</p> <p>PASSED</p>
<p>E></p> <p>AC FLASH CLASS I</p> <p>Ramp Up</p> <p> </p> <p>0 0.87 kV 100%</p>	<p>F></p> <p>AC FLASH CLASS I</p> <p>Ramp Hold</p> <p> </p> <p>0 1.25 kV 100%</p>	<p>G></p> <p>AC FLASH CLASS I</p> <p>Ramp Down</p> <p> </p> <p>0 0.43 kV 100%</p>	<p>H></p> <p>AC FLASH CLASS I</p> <p>Leakage (mA): 1.85</p> <p>PASSED</p>
<p>I></p> <p>DC I.R. CLASS I</p> <p> </p> <p>0 Progress 100%</p>	<p>J></p> <p>DC I.R. CLASS I</p> <p>I.R. (MΩ): >49.9</p> <p>PASSED</p>	<p>K></p> <p>SECURE PRODUCT</p> <p>Close guard and</p> <p>Depress LOAD button</p> <p>To continue test</p>	
<p>L></p> <p>LOAD 240V</p> <p> </p>	<p>M></p> <p>LOAD 240V</p> <p>CURRENT (A): 3.9</p>	<p>N</p> <p>RUN MODE 1</p> <p>BSN: 00001 IN: 0002</p> <p>Release safety guard</p>	

Section 6 - Additional Information

Test Loading

This instrument is designed to cope with resistive, capacitive and inductive loading.

Most domestic appliances can be tested safely at 1250 Volts a.c.(class I), or 3750 Volts a.c. (Class II), with the leakage trip set to 3 mA. Highly capacitive loads may require higher trip levels or the use of a DC test voltage.

Equipment containing either input filters or sensitive electronics may also require the use of the D.C. function.

Ramp Profiles

In normal use the 'quickest' test recommended is of two seconds duration with a ramp profile of –

2 sec. Ramp Up - 0.5 sec. Hold - 1 sec. Ramp Down

This set up is the best compromise between all of the applicable constraints with regard to EMC, residual charge and volume throughput in production.

Nuisance Tripping

If nuisance tripping is found to occur during RAMP UP then the rise time should be increased, in 0.5 second stages, until this does not occur. The RAMP DOWN time should then be made equal to this, to allow time for the capacitance to discharge at the end of test. The Hold time can be set to 0.5 seconds in a case such as this to minimise test time.

We do not recommend increasing the leakage current limit in order to decrease the test time on the device under

Arc Detection

This instrument also has an overriding safety trip and 'Arc' detector which is factory set to meet the majority of customer requirements, this will operate independently of the values entered in the Set-Up procedure.

For a customer requirement of a nominal 10.00mA r.m.s. trip, this would normally be set to 14.00mA 'Peak' as an overriding safety device. So please check your specification to avoid any Nuisance Tripping being introduced due to confusion.

RS232 Data Output

Protocol

This is performed at 19200 baud, no parity and 1 stop bit, using an asynchronous, 3-wire, non-handshaking type RS232 physical connection.

The information is output as a data stream of Comma Separated Values (CSV), which is automatically downloaded at the end of each completed test profile.

The standard output format, unless otherwise requested is as follows –

Item	Description	ASCII characters	Numerical range
1	Batch Number	5	00000 - 50000
2	Item Number	4	0000 - 9999
3	Date	8	DD/MM/YY
4	Time	8	HH/MM/SS
5	Test Profile Number	1	0-9
6	Test Type	1	0-7 – see Note 1
7	Test Mode	1	0 or 1 - see Note 2
8	Test Status	1	0 or 1 - see Note 3
9	Result	1	0 or 1 – see Note 4
10	Test Value	6	0000.0 – 9999.9

Items 6 – 10 are repeated sequentially for each test in the Test Profile. Each complete data stream is terminated with ASCII Carriage Return (CR) plus Line Feed (LF) codes.

NOTES

1. Test Types

Test No.	CLARE Notation	Description
0	L-N	Line to Neutral Continuity Test
1	EC	Earth Continuity Test
2	F1	Class 1 Flash Test – Line/Neutral to Earth
3	F2	Class 2 Flash Test – Line/Neutral to Outer Surfaces (via HT Probe port)
4	IR1	Class 1 Insulation Test – Line/Neutral to Earth
5	IR2	Class 2 Insulation Test – Line/Neutral to Outer Surface (via HT Probe port)
6	LOAD 240	Load / Function Test at 240V a.c.(G103) only

2. Test Mode - 0 or 1 data depends on the Test Type

- for an EC test (Test type 1) 0 = milliohms, 1 = millivolts for the displayed test value
- for a Flash test (Test type 2 or 3) 0 = AC, 1 = DC applied voltage
- for a Load Test (Test type 6 or 7) 0 = Upper limit only, 1 = Upper and Lower limits for acceptance band.

3. Test Status

- 0 = incomplete test, i.e. test not applied or aborted partway through
- 1 = test completed.

4. Test Result

- 0 = FAIL
- 1 = PASS

DATA STREAM EXAMPLES

Example 1 (G102):

For Batch 1 / Item 6, tested on 14/01/02 at 12:36:45, using Profile 1 set for L-N, EC, F1(AC), IR1 and Load 240 test with upper limit only and returning results of L-N – 45.8 ohms, EC – 96 milliohms, Flash Leakage – 3.2mA, Insulation Resistance of 6.8 Megohms.

Data Stream:

00001,0006,14/01/0212:36:45,1,0,0,1,1,0045.8,1,0,1,1,0096.0,2,0,1,1,0003.2,4,0,1,1,0006.8, CR+LF.

Example 2 (G103):

For Batch 2 / Item 24, tested on 24/01/00 at 09:40:23, using Profile 2 set for L-N, F2(DC), IR2 and Load 240 test with upper and lower limits and returning results of L-N – 24.5 ohms, Flash Leakage – 1.2mA, Insulation Resistance of 7.8 Megohms and Load current of 4.2 Amps.

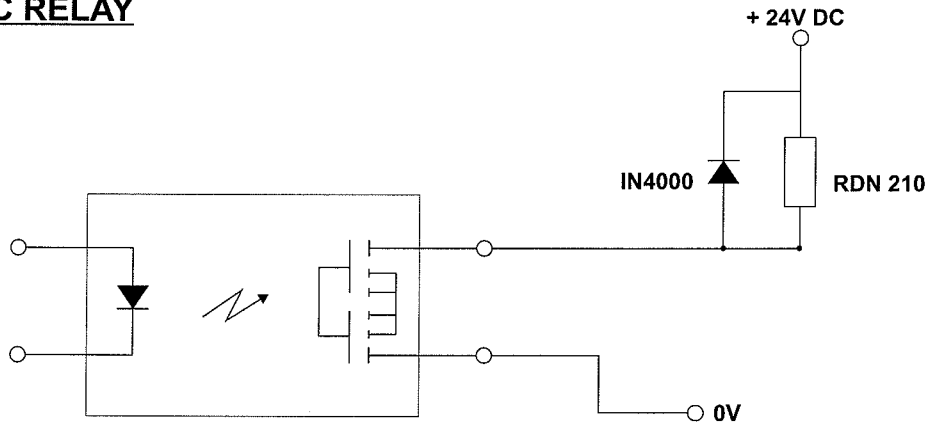
Data Stream:

00002,00024,24/01/00,09:40:23,2,0,0,1,1,00024.5,3,1,1,1,00001.2,5,0,1,1,0007.8,6,1,1,1,0004.2 CR+LF.

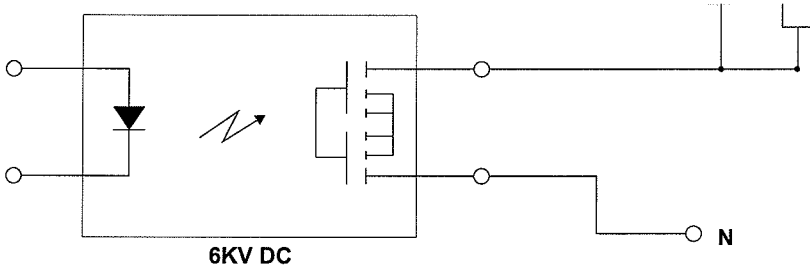
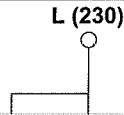
ISI EXAMPLE USAGE

I.S.I. APPLICATIONS

DC RELAY

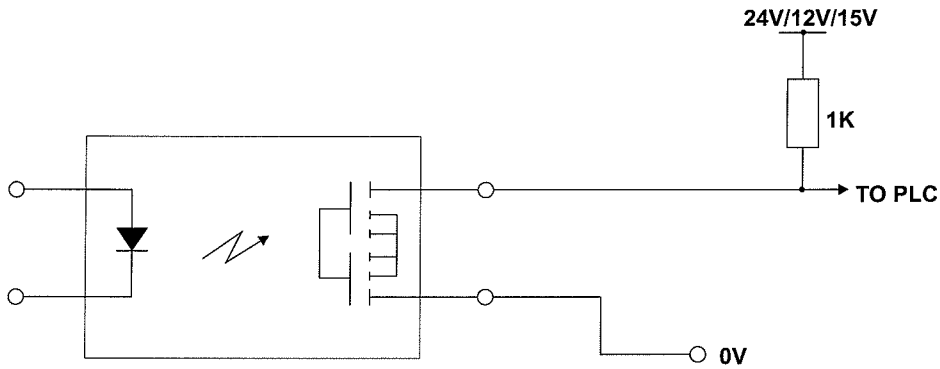


MAINS



*MANUFACTURERS PART No. KRAUS & NAIMER S1400 240/044 RCB 210

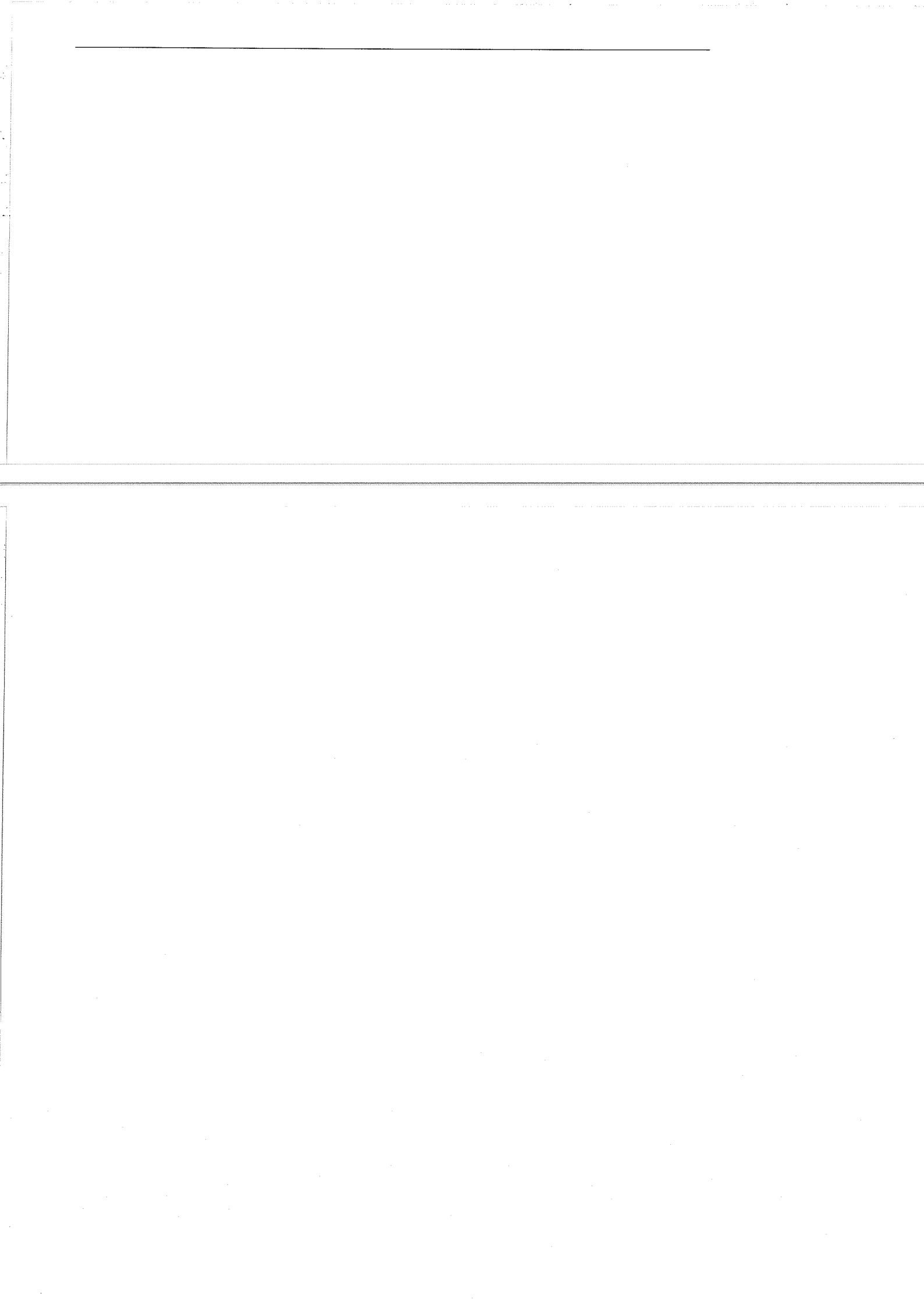
PLC

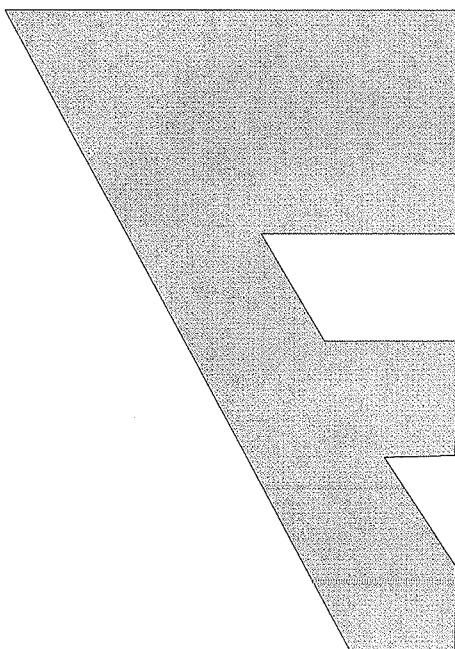


SPECIFICATIONS - Genius family

Test type	Application	G102	G103	
Phase – Neutral Continuity	Test voltage	5 V D.C.	✓	✓
	Acceptance range	10 – 1000 Ω	✓	✓
	Accuracy	±2 %, ±2 Ω	✓	✓
	Test duration	0.5 – 10.0 S	✓	✓
	Trip level lower/upper	10 – 999 Ω ±2 %, ±2 Ω	✓	✓
Earth Bond	Test voltage	7.5 V a.c.	✓	✓
	Output current range	10 – 25.0 A settable in 0.1 A steps	✓	✓
	Compliance ranges	0 – 150 mΩ @ 25 A, 0 – 500 mΩ @ 10 A	✓	✓
	Measurement range mΩ	0 – 500mΩ, ±2 % ± 1 mΩ	✓	✓
	Measurement range mV	0 – 5000 mV, ±2 % ± 1 mV	✓	✓
	Test duration	0.5 – 10.0 S	✓	✓
	Trip level upper/lower	1 – 1000 mΩ	✓	✓
AC/DC Flash	Test voltage	0 – 5.0 kV settable in 10 V steps	✓	✓
	Class I test output	0 – 5.0 kV	✓	✓
	Class II test output	0 – 5.0 kV	✓	✓
	Output rating	500 VA	✓	✓
	Waveform	distortion less than 1 %	✓	✓
	Line/load regulation	better than 1 %	✓	✓
	Maximum slew rate	10 kV/S	✓	✓
	Ramp timer (up/down)	0.5 – 10.0 S	✓	✓
	Dwell timer	0.5 – 300.0 S	✓	✓
	Leakage trip – upper	AC: 0.1 – 10.0 mA in 0.1 mA increments DC: 0.1 – 5.0 mA in 0.1 mA increments	✓	✓
	Leakage trip – lower	AC: 0.1 – 10.0 mA in 0.1 mA increments	✓	✓
	*no test detection	DC: 0.1 – 5.0 mA in 0.1 mA increments	✓	✓
	Trip accuracy	±2% of setting ± 0.05 mA	✓	✓
	Failure mode	breakdown and/or trip	✓	✓

DC Insulation Resistance test	Test voltage	500V D.C.	✓	✓
	Trip range	1.0 – 49.9 MΩ ± 5 % ± 0.2 MΩ	✓	✓
	Test duration	2–300.0 S	✓	✓
Load Test	Supply voltage	230V a.c. 110V a.c. (Duty cycle 30 %)		✓
	Measurement range	0 – 10.0 A		✓
	Test duration	0.5 – 300.0 S		✓
	Trip level – upper/lower	0.1 – 10.0 A		✓
	Accuracy	± 2 % ± 0.05 A		✓
General	Operating mode	Automatic or manual	✓	✓
	Temperature	0 to +40 °C storage + 10 to + 35 °C operation	✓	✓
	Humidity	95 % max. non condensing	✓	✓
	Dimensions and weight	488W x 475D x 472H, Weight 50 kg 370W x 485D x 185H, Weight 24 kg	✓	✓
Options	Alternative supply	110 V a.c. operation	✓	✓
	RS232	3, 5, 10 meter cables	✓	✓
	Printer	Star industrial label printer	✓	✓
	High visibility beacon	Low voltage red/green surface mounted	✓	✓
	Testing enclosure	See appropriate catalogue section	✓	✓
	Bespoke design	Contact Clare with your individual requirements.	✓	✓
	Profile Selector Port	For remote selection of profiles Remote Profile Selector Box (0-7 Profiles)	✓	✓
	Isolated Status Indicator	For external monitoring or control of PLCs, contactors or relays	✓	✓





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