

GOODBURN

Goodburn Engineering Ltd

SPECIAL METALS - PLASTIC WELDING - DATA ACQUISITION

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HIGH FREQUENCY SPARK TESTER

WITH REMOTE PROBE

TYPE ST-R

INSTRUCTION MANUAL

GENERAL DESCRIPTION

The ST-R spark tester consists of a light weight, hand-held probe connected by a cable to a portable generator. The portable generator is housed in a thermoplastic case with the following features :-

Front Panel

- Mains ON/OFF rocker switch, with an indicator lamp.
- Variable output control knob .
- Handle probe connection.

Back panel

- IEC mains input socket.
- Earth socket.
- Main fuse holder
- Serial Number label

The remote probe handle has a spring-loaded switch that will operate the spark generator. Spark generation will stop as soon as this switch is released. The remote probe contains the HF coil and the test electrode. The unit is supplied with an E5 flexible probe.

TECHNICAL DATA

Operating temperature range : 0 to +30°C

Relative Humidity : Maximum 80% (Non-Condensing)

Storage temperature range : -10 to +40°C

Supply voltage : Separate models for 110V ± 10% A.C. and 230V ± 10% A.C.

Supply frequency : 50 to 60 Hz

Power consumption : 50 watts

Output voltage : 5 to 55KV

Net Weight : 3.7kgs

Dimensions (Generator) : 205mm W x 175mm D x 130mm H

Installation Category : Category II (over-voltage transients)

HEALTH AND SAFETY

The works safety officer should approve the installation of this equipment and that the operator has been trained in its use.

The ST-R Spark Tester is intended to generate a powerful high frequency discharge, therefore the unit should only be used by responsible and authorised personnel that have read and understood this manual.

The spark tester is designed to protect the operator from receiving a dangerous electric shock. The high voltage output is isolated from the mains supply.

The probe should NEVER be directed at the body.

The high voltage generated by this unit is at a high frequency, well above the motor frequency of the human central nervous system. A serious shock is unlikely if the probe is accidentally touched during operation, but the greater risk is to those who might have an incipient heart condition, or the reflex action when receiving a high frequency shock. Injury could also occur if the spark reached sensitive parts of the body (e.g. eyes).

Accidental touching of the probe will cause a shock whilst it is painful and unpleasant it is not dangerous. All high voltage test equipment must be operated by responsible and authorised personnel and yellow warning labels should be prominently displayed. Should the operator accidentally touch the test electrode when the equipment is in use, he may experience a mild shock and in order to avoid this possibility, the wearing of rubber or plastic gloves and conductive footwear is recommended. Furthermore, the operator should enjoy good health and not suffer from a cardiac condition.

It is recommended that testing should be conducted well clear of personnel not involved in the testing procedure, or in such a position where surprise of receiving an electric shock could cause a related accident. If for example, tests being conducted close to moving or rotating machinery or in such an unstable position that the operator should fall and injure himself. It is recommended that the operator should have an assistant to ensure that unauthorised personnel are kept clear of the testing area and generally assist when necessary with the testing procedure.

The unit should be used in a reasonably ventilated area with a volume greater than 40 cubic metres. The exposure to ozone produced by the high voltage spark should not present a major risk to health. In a 'confined space' situation then it is likely that ozone levels will exceed the exposure limit and present some risk to health. Under these conditions adequate ventilation should be provided.

ELECTROMAGNETIC EMISSIONS - EUROPEAN UNION DIRECTIVE 89/336/EEC:

Before operating the spark tester it is essential that the following action be taken.

RISK ASSESSMENT:

As this equipment will produce an electromagnetic emission when the spark locates a fault to earth. A risk assessment of the area in which the unit will be used should be carried out. For example, the equipment should not be operated where the electromagnetic disturbance generated may hinder the operation of other electronic equipment such as computers, test equipment, cables running above, below or near the area or mobile phones. Any disturbance to such equipment is rarely permanent.

The wearers of pacemakers and hearing aids should also be considered.

The Directive also requires the above types of equipment to have an adequate level of electromagnetic immunity from such emissions.

As a guide, an arc welder would create interference far greater than this type of tester. It would, therefore, be reasonable to assume that if an arc welder had been used in the area, without problems, then using a Spark Tester would be safe.

The test area itself should also be considered. The layout of the area would affect the distances which the emissions would travel. Buildings and metal structures would shield against, or reduce, emissions. If the tester were used inside a metal tank, for instance, the tank would act as a very good shield. This would not, however, have the same effect if it were used in a plastic tank. Testing on the circumference of a metal pipe may cause the pipe to act as an aerial and transmit the emissions further than expected.

Please bear in mind that electromagnetic emissions travel in all directions and can even be bent or deflected. This includes upwards and downwards so proximity to other floors of buildings and even airports must be considered. Neighbouring works or sites should also be taken into account as there may be equipment in use that could be affected by your tester's emissions.

The SITE SAFETY OFFICER should always be consulted before any testing is carried out. This is particularly necessary where electronically controlled equipment is being used on the same site.

Timing of the testing should also be considered as a way of avoiding interference problems. Consider testing when all susceptible equipment in the test area is switched off or not in use.

If the tester is only used in one area, then simple tests will ascertain where the tester interferes with other equipment and these can be resolved by scheduling the proper testing accordingly. Again, you should remember neighbouring works.

Always ensure that the tester and test piece are securely earthed because this will reduce any interference generated by the spark. This also prevents static build-up in the operator and thereby avoiding electric shock. An earth socket is provided on the rear panel of the unit.

WHEREVER YOU ARE INTENDING TO USE EQUIPMENT OF THIS TYPE, ON YOUR SITE OR ON A CUSTOMER'S, ALWAYS OBTAIN CLEARANCE FROM THE COMPANY SAFETY OFFICER.

APPLICATIONS

INSULATION TESTING

Any insulating material such as rubber, ebonite, all plastics, bitumastic coatings and nylon, can be checked for freedom from pin-holes by exploring the surface with the probe and backing the insulant with an earthed plate. An earth socket is provided on the unit's rear panel. Avoid puncturing the work by using excessive voltage.

LEAK DETECTION

The spark tester will readily locate leaks in evacuated glass systems. Pass the probe over the glass surface and providing the system pressure is in the range 0.01 torr to about 10 torr, any small cracks or pin-holes will cause the spark to concentrate and pass through at that point creating a glow discharge within. When leak searching thin glass the minimum spark is advised and the probe should be kept moving to avoid the risk of rupturing the glass. Great care should be exercised at sharp bends or where the glass may be under stress.

LEAK PATH REMOVAL

Films of contaminating materials deposited on insulators can produce undesirable electrical leakage. Such deposits can be removed by applying the high frequency discharge to the conduct near the point of leakage, disconnect all associated equipment before doing this.

OZONE PRODUCTION

The spark tester may be used as a convenient source of small amounts of ozone, useful for chemistry lecture demonstrations. A variety of probes, insulated extension rods and special electrodes are available in kit form or as single items.

MAINTENANCE

The ST-R will require no maintenance by the user other than keeping it clean and undamaged. It should be inspected from time to time to check that the case, remote probe handle, connecting cable or mains cable have not been damaged. If any damage is found the unit must not be used and it should be returned to the manufacturer for repair.

CALIBRATION

The unit is supplied fully calibrated.

A spark of approximately 1.7kV will jump a gap of around 1mm between small spherical surfaces. i.e. 10mm gap = approx. 17kV. This breakdown voltage will be less for smaller spheres or pointed probes as the electrical stress at the tip is higher.

The unit calibration can be checked using our CAL55 HV calibrator.

INSTALLATION AND USE

UNPACKING

Remove the ST-R from the packaging and check them for damage. If any part is damaged, notify the supplier immediately. Do not attempt to use the unit.

The package should contain the following items:

- 1 x generator unit and remote probe handle.
- 1 x E5 Flexible electrode
- 1 x 2m Mains cable.
- 1 x operating instructions.

If any of these are missing, contact your supplier immediately.

SET UP AND USE

1. Check that the operating voltage is in accordance with the available supply voltage.
2. Connect the mains lead supplied to the socket on the back panel of the product.
3. Screw the flexible probe electrode into the red end of the remote handle.
4. Set the output control knob fully anti-clockwise (minimum output) and check that the mains ON/OFF switch is in the OFF position. Connect the plug to the mains supply socket and switch it on.
5. Hold the probe handle in one hand so that the probe tip is at least 20cm from any object and switch ON the generator.
6. Select the output for the required size of spark by holding the probe tip close to a suitable earth point, press the operating button on the probe handle and turn the control knob to set the required spark length.

ANTICLOCKWISE - MINIMUM OUTPUT,
CLOCKWISE - MAXIMUM OUTPUT.

7. Spark production can be controlled by the operating button on the remote handle. Release the switch and spark production will stop. This acts as a fail-safe device, stopping spark production in the event that the probe is dropped.
8. The high voltage spark should only be taken from the end of the flexible probe and not from the side i.e.. through the probe's plastic covering, as the heat of the spark may melt the plastic and could cause a fire hazard.
9. The probe should be kept moving as far as possible when testing as the high frequency output can cause heating in the article under test and could burn a hole in it.
10. The output control should be adjusted for the lowest output at which an effective test can be carried out.
11. The surface of the object to be tested should be systematically checked by going over it with the correct probe of the spark tester. Voids or defects will be recognised by the passage of a bright spark. At the same time a hissing noise is observed. It is thus possible to find the exact location of the defect and to mark its position. After repair, a further check can be made to ascertain whether the repair has been successful.
12. When the testing has finished, switch OFF the generator and remove the plug from the mains supply. Do not leave the unit unattended either with the main switch ON.

WARNINGS

WARNING

THE POWER SUPPLY TO THIS EQUIPMENT MUST BE EARTHED

WARNING

NEVER TOUCH THE TEST PROBE OR DIRECT IT AT THE BODY

WARNING

**THIS EQUIPMENT SHOULD NOT BE USED IN A COMBUSTIBLE
ATMOSPHERE AS THE SPARK MAY CAUSE
IGNITION AND AN EXPLOSION COULD RESULT**

WARNING

**THIS EQUIPMENT SHOULD NOT BE USED IN OR EXPOSED TO DAMP OR WET CONDITIONS, OR
WHERE THE CONCENTRATION OF CONDUCTIVE DUST IS EXCESSIVE**

WARNING

**THE EQUIPMENT SHOULD NOT BE OPERATED IF
ANY PART OF IT IS IN A DAMAGED CONDITION.**

WARNING

**DO NOT CONNECT OR DISCONNECT THE TEST PROBE ELECTRODE
WITH THE SPARK GENERATOR SWITCHED ON OR CONNECTED TO THE
MAINS SUPPLY.**