BUCKLEYS

MANUFACTURERS OF SPECIALIST TEST EQUIPMENT

DTU6

Operating Instructions

English Version

Please read carefully before use

5830-0018 DTU6/IM/ENG/V.02-25

Contents

Description

The DTU6 unit is designed to deliver an adjustable stabilised DC output voltage of 500V to 6kV for the detection of pinholes or porosity in dielectric (insulating) protective coatings applied to the metal substrate of a diathermy instrument.

Fault detection is indicated by an audible alarm and a red LED on the front panel. There are two conditions that will cause an alarm:

- A transient current pulse, caused by the ionisation of the air that exists in an imperfection of the coating material. Upon transient fault detection, the high voltage generator is momentarily disabled, during this time the alarm will sound and the alarm LED will be illuminated. The test voltage will also be displayed as zero. Disabling the high voltage generator allows the spark repetition rate to be controlled.
- If a leakage current greater than 100µA flows and the test voltage is reduced by 100 volts. In this scenario, the generator will continue to apply a constant current to the fault, the alarm will sound and the alarm LED will be illuminated. A reduced test voltage will be displayed.

The test voltage is set by the voltage decrease button and the voltage increase button. This value will be retained when the unit is powered down. This voltage will remain stabilised as the batteries discharge.

The battery level indicator is displayed in the left side of the LCD display:

▉	Indicates fully-charged batteries.
=	Indicates battery voltage between 5 and 3.8 volts.
-	Indicates exhausted batteries.

Replace batteries with alkaline for best performance. Dispose of exhausted batteries in accordance with environmental regulations.

The high voltage generator is momentarily disabled on fault detection and the short circuit current is well within the safety limits required for this type of equipment.

Due to the fact that the output voltage is DC, the material under test is subjected to minimum electrical stress.

For periodic checking of the accuracy of the DTU6 meter, a separate calibration meter can be supplied, but a good commercial high impedance test meter can be used (>10MΩ input impedance).

Technical Specifications

Output voltage range:	500V - 6kV DC (10V steps)
Maximum continuous output current:	150µA
Alarm sensitivity:	Automatic
Operating time:	10 Hours at full output no load
Meter accuracy:	+- 1.5% plus one digit
Power consumption:	1.2 Watts (6kV no load)
Dimensions:	W: 228mm, H: 76mm, D: 216mm
Weight:	900g (unit only)

The unit may be operated from 4 AA cell batteries or from the mains; a DC adaptor is supplied with the unit.

Please refer to the rear mounted rating label for battery carriage and DC socket locations.

Safety Precautions

High voltage testing equipment should be operated by authorised personnel only.

The output test voltage of this equipment is derived from a current limited output, however, should the operator accidentally make contact with the electrode, they may receive an electric shock. If this situation is unavoidable we recommend that rubber or plastic insulating gloves be worn.

Furthermore, the operator should be in good health and - in particular – not suffer from a cardiac condition.

DANGER: Do not use test equipment of this type in any combustible atmosphere as the test voltage will cause an arc or spark, and an explosion could result. Therefore the hospital Safety Officer should be consulted before proceeding with operation.

WARNING: Individuals fitted with a pacemaker, cochlear implant, or trans-dermal electronic implant - e.g. glucose monitor, should not operate or use our high-voltage test equipment.

WARNING: Users should not attempt to modify the instrument in any way. In particular, they should not connect the HV output to any electrodes or accessories other than those supplied by Buckleys (or their approved distributors) and specifically designed for use with the DTU6. The HV output should not be connected to ground.
Failure to follow this warning may lead to the instrument or its accessories being operated outside their design limits which may invalidate the warranty and lead to damage or personal injury.

Unpacking

Remove the DTU6 and accessories from the packing and check them for damage. If any part is damaged, notify the supplier and carrier immediately, keep all packing material for inspection and do not use the DTU6.

The package contains the following items:

Basic Kit (6002-0012)
DTU6 unit
DTU6 Drum Brush electrode
Plug-In Power Supply 7.5V DC 800mA Regulated
4x AA Batteries
Operating Instructions
Calibration Certificate
1m Diathermy Lead
1m Earth Lead
1m Test Lead (red)

Complete Kit (6005-1010)
DTU6 unit
DTU6 Drum Brush electrode
Plug-In Power Supply 7.5V DC 800mA Regulated
4x AA Batteries
Operating Instructions
Calibration Certificate
1m Diathermy Lead
1m Earth Lead
1m Test Lead (red)
DTU6 Round Electrode 3, 4, 5 & 10mm holes
DTU6 V-Electrode
DTU6 Brush Housing
Aluminium Carry Case

If any of the above items are missing, please contact your supplier immediately. Keep the packaging in case the unit needs to be sent back for repair or calibration in the future, or needs to be stored.

Operating Instructions

Connect the diathermy instrument test lead to the HT return socket located on the rear of the unit (see illustration), or on the side of the unit for older models.

Insert the electrode into the red electrode socket on the top of the unit.

Power up the unit by pressing the On/Off button (**2**, see **Fig.1**). The unit will momentarily display the last set test voltage. The unit will then display 'Ready' indicating the unit is ready for use.

The desired test voltage may now be selected using the voltage decrease button (**3**) or the voltage increase button (**5**). This value will be retained when the unit is powered down. The display will return to the 'Ready' message.

Pressing and holding the high voltage on button (**4**) will energise the electrode to selected voltage potential which will be displayed in the LCD display window (**1**). The instrument under test may be drawn across (or through) the test electrode (see **Fig.2**). Fault detection is by audible alarm and the illumination of the red LED alarm window (**6**).

When testing is completed, the unit may be powered down by pressing the power On/Off button (**2**). The unit will display 'Shutdown' in the LCD display window. The DTU6 also features auto shut down after five minutes of inactivity.

1 LCD display
2 Power On/Off button
3 Voltage decrease button
4 High voltage On button
5 Voltage increase button
6 Alarm indication LED window

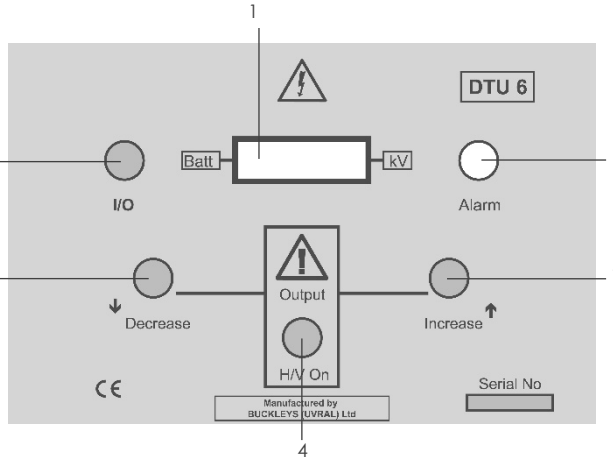

Fig.1 - DTU 6 Control Panel

1 Drum Brush Electrode
2 Electrode Socket
3 HV return socket

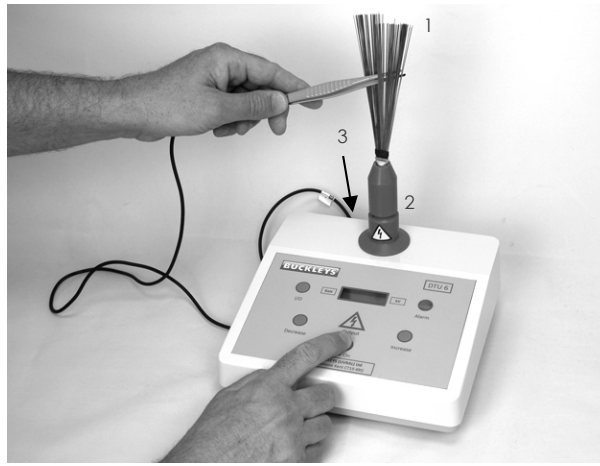

Fig.2 - Testing a diathermy instrument

Setting the test voltage

It is important to choose an appropriate test voltage – it must be sufficient to ensure that faults are detected, but not so high that it may cause damage to the items being tested.

There are various published specifications for voltage calculation and the surgical instrument manufacturer may also have published suitable test voltages. If these are not available, it is necessary to know the coating material and minimum acceptable thickness in order to establish the necessary voltage for the test. The voltage must, in all cases, be sufficient to arc across an air gap of the coating thickness – this is approximately 3kV per millimetre of coating thickness. Thin coatings are susceptible to damage and care must be taken to avoid creating and maintaining an arc from a metallic part of the instrument, and then "drawing" this onto the insulation as the instrument is moved across the electrode as the intense local heat of an arc will carbonise the insulation and this can only be repaired by recoating the instrument.

Without detailed information about the coating material and thickness, it is clearly not possible to provide more than basic guidance however the very thinnest coatings should be tested at low voltages – eg 500-800V whereas thicker layers will require a higher test voltage, which may be up to 6kV, the maximum that the DTU will generate. If damaged instruments of the same type are available as test pieces, the voltage may be adjusted to the lowest level which will reliably detect a fault in the material.

Types of fault

Surgical instruments in service may exhibit several types of defect – the coating may be cut or cracked, or the thickness may be reduced by abrasion. Cuts or cracks may not extend all the way to the underlying metal, but careful choice of the test voltage will enable areas of reduced thickness to be detected, as well as any areas where the insulation has completely failed.

Other underlying faults in the insulation layer would normally be detected at manufacture, and need not concern us.

Maintenance

The DTU6 was designed for minimum maintenance by the user, however the following periodic checks/actions are recommended.

- Check the HT return lead for continuity.
- Keep the unit clean so that the control wording can be seen.
- Send the equipment back to the manufacturer or their agent for recalibration at yearly intervals.
- Remove the batteries if the unit is not in use for prolonged periods.

Troubleshooting

Q. Alarm sounds for no apparent reason as the test instrument is moved over the electrode.

A. Is the surface clean and dry? Moisture on the surface is conductive; this may cause a leakage current of greater than 100µA, which in turn will cause the test voltage to drop and the alarm to sound.

Error messages

- **Error 1** - This indicates that the electrode voltage has exceeded the operator selected voltage by >100 volts.
- **Error 2** - This indicates that the test voltage is present at the electrode without the HV output button being pressed.

In either case, the DTU6 will attract the operator's attention by bleeping and displaying the error message. The DTU6 will then display shutdown and power down. The unit should be returned to the supplier for repair or calibration.

Disposal information

This Product must be disposed of in accordance with your local WEEE guidance.

For further information on UK WEEE regulations click on:
http://www.gov.uk/government/collections/producer-responsibility-regulations

Risk Assessment

It the user's responsibility to complete a risk assessment before using Buckleys equipment. The following points offer some guidance but must not be assumed to be complete or sufficient.

Personal safety

- Have all users been trained in the correct and safe use of the instruments?
- Are they aware that the instrument produces high voltages, and can give electric shocks if used incorrectly?
- Is the instrument in good condition, undamaged? Is the instrument dry? Are the accessories similarly in good condition, dry and undamaged?
- Is it possible to ensure that persons with pacemakers, cochlear implants or trans-dermal implants of any kind are sufficiently far from the instrument & test site to be safe?
- Ozone is an irritant gas which will be produced when the instrument produces sparks – is there sufficient, suitable ventilation in place to ensure that this is not hazardous?

Explosion & Fire Risk

- Buckleys high-voltage instruments will produce sparks - Are you certain that there is no risk of an explosive atmosphere?
- Have all easily-ignited and/or flammable materials been removed from the area to be tested?

EMC & RFI

- Buckleys high-voltage instruments will produce sparks which may create interference in nearby electronic apparatus, particularly communication and computer equipment.
- Are you certain that there is no risk of such interference causing a danger to others – particularly medical or life support equipment?
- Are you sure that there is no risk of such interference causing costs or inconvenience to others – eg industrial processes, measuring equipment, scientific apparatus, domestic radio and TV?

Other Risks

- Have you checked that there are no ongoing processes in the area that may be dangerous – X-ray machines, other radiation?
- Are you certain that the instrument has not been immersed, dropped or otherwise damaged in a way that is not obvious?
- Is the person responsible for site safety aware of / fully understanding the testing you are going to do, and has it been reviewed in line with the site procedures?

NOTE: 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.

EC Declaration of conformity

We, Buckleys (UVRAL) Ltd., as manufacturer of the apparatus listed, declare that the product **DTU6 DC Holiday Detector** is manufactured in conformity with the following directives: **2014/30/EU**, **2014/35/EU**, **2015/863/EU** and **2011/65/EU (RoHS)**.

Date: 01/07/2021

Authorised by:

J P Hoveman

CEO, Buckleys (UVRAL) Ltd.

CE

UKCA Declaration of Conformity

We, Buckleys (UVRAL) Ltd., as manufacturer of the apparatus listed, declare that the product **DTU6 DC Holiday Detector** is manufactured in conformity with the following UK legislation: **Electronic Compatibility Regulations 2016**, **The Electrical Equipment (Safety) Regulations 2016** and **Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012.**

Date: 01/07/2021

Authorised by:

J P Hoveman

CEO, Buckleys (UVRAL) Ltd.

UK CA

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Distributor details

Product registration

Thank you for choosing a Buckleys product, we are sure it will provide you with many years of reliable service.

Please register this product via Buckleys' website and download the Warranty Registration Certificate.

Register your product in 5 minutes

Once your product is registered, you will receive the following benefits:

- **FREE** annual service & calibration reminders by email
- **Latest** industry news relating to your product
- Be the **first** to hear about our new products

We strive to improve the quality of our products and service.

Registering your product helps us monitor overall quality of our products, service and dealer network. Additionally, if we ever need to contact you regarding your product, we are able to do so immediately.

We will also send you annual service/calibration reminders by email to help ensure your product is always in perfect working order.

To register your product, simply visit:

www.buckleysinternational.com/registration

Complete the online form and click on SUBMIT.