JCI 176 CHARGE MEASURING SAMPLE SUPPORT

for charge decay measurements on layer and fabric samples with opportunity for direct measurement of the quantity of corona charge transferred and for calculation of 'capacitance loading'

DESCRIPTION:

The JCI 176 Charge Measuring Sample Support provides opportunity to measure how much corona charge is received by the sample during corona charge decay testing with JCI 155 Charge Decay Test Units. Such measurements enable calculation of the 'capacitance loading' experienced by charge on materials. This is relevant to assessment of the suitability of materials in terms of the surface voltages likely to arise and for how long [1,2]. For simple and basic studies film and layer samples may be supported using a JCI 166 Sample Support Unit.

In the JCI 176 layer and fabric samples are mounted between two hinged flat metal plates that have apertures to expose an area of sample rather larger than the 45x54mm test aperture of JCI 155 instruments. The charge received by the sample is measured as two components: first, the 'conduction' charge that flows directly from the sample to the mounting plates or is capacitively close coupled to them. Second, is the 'induction' charge that is retained where it is deposited on the sample. The 'conduction' charge component is measured directly by a 'virtual earth' charge amplifier connected to the sample mounting plates. The 'induction' charge component is measured by a 'virtual earth' charge amplifier connected to an induction electrode mounted below the sample. This 'induction' sensing electrode is a fairly symmetrical geometric match below the sample surface to the sensing region of the JCI 155 above. In prospect the quantity of charge induced on this electrode structure will be about 50% of the total charge retained on the sample that does not directly couple to the mounting plates. The total charge received is the sum of the conduction charge and the induction charge multiplied by a factor of about 2. The value of the factor is determined and checked experimentally.

The apertures in the sample mounting plates are 5mm larger all round than the 45x54mm test aperture of the JCI 155. Tests show that there is very little direct coupling to these plates from the high voltage pulse applied to the corona discharge electrodes or by leakage corona current flow.

The sensitivities of the conduction and induction charge sensing amplifiers have been chosen to be 500 and 4000nC full scale for conduction charge measurements and 50 and 400nC for induction charge measurements. These sensitivities allow measurements down to the quantities of charge transfer likely to occur in tribocharging events. This is to allow direct cross comparison between tribo and corona charging characteristics of materials.

Two sets of analogue output signals are provided. Observations can be linked

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Instrumentation

directly to JCI 155v5 instruments for recording alongside charge decay measurements. In parallel observations can be displayed and recorded, for example using a digital storage oscilloscope or paper chart recorder.

[1] J. N. Chubb *"Measurement of tribo and corona charging features of materials for assessment of risks from static electricity"* Trans IEEE Ind Appl 36 (6) Nov/Dec 2000 p1515
[2] J. N. Chubb *"New approaches for electrostatic testing of materials"*
ESA meeting, Brock University, Niagara Falls, June 18-21 2000 J. Electrostatics 54 March 2002

SPECIFICATION

Sample size:	• 100 x 100mm or larger
Charge sensitivity:	• Conducted charge: 1V per 125nC and 1V per 1000 nC • Induction charge: 1V per 12.5nC and 1V per 100nC
Controls:	• On/off slide switch: • Charge zeroing pushbutton
Power supply:	• Two replaceable PP3 batteries or external ±7V supplies via 8w mini DIN • by direct 8w-8w mini DIN cable connection to JCI 155v5 • power on indicated by red LED
External connections:	• via two 8w mini DIN connectors: - analogue output signal: conduction charge x1 & x8 (±4V FSD) - analogue output signal: induction charge x1 & x8 (±4V FSD) - remote charge zeroing - earth - external power supply inputs
Earth bonding:	• Combination 10mm Durable and 4mm bayonet socket earth bonding point.
Dimensions:	• 190x206mm 65mm high. Weight: 2 kg

JCI 155v5 Charge Decay Test Unit on JCI 176 Charge Measuring Sample Support

HELP LINE
JCI offers consultancy through which we advise and assist customers who need to assess and overcome problems with static electricity. We also test customer materials for static charge dissipation and capacitance loading performance.

The business of JCI is the design, development, manufacture and marketing of high quality instruments for electrostatic measurements. JCI also carries out electrostatic testing of materials, consultancy and calibration of JCI instruments to BS 7506: Part 2: 1996.

For further information contact Dr John Chubb at:
Unit 30, Lansdown Industrial Estate, Gloucester Road, Cheltenham, GL51 8PL, UK
(Tel:+44 (0)1242 573347 Fax:+44 (0)1242 251388 jchubb@jci.co.uk http://www.jci.co.uk)

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John Chubb Instrumentation