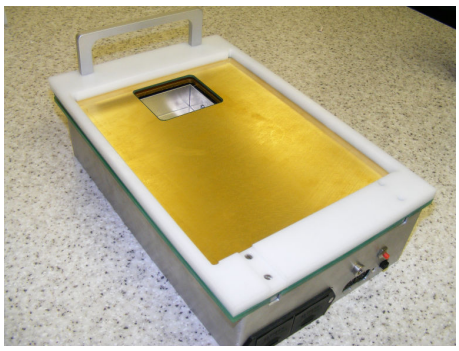
JCI 176 Charge Measuring Sample Support

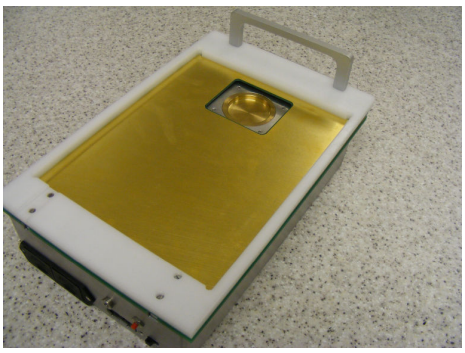
For simple flat mounting of layer and fabric samples with opportunity for direct measurement of the quantity of charge transferred with corona charge deposition.

INTRODUCTION

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 (without capacitance loading), film and layer samples may be supported using a JCI 166 Sample Support Unit. Simple studies of powders can also be made with the convenient combination of the JCI 170 powder support disc and JCI 172 charge decay apparatus support. Further to this the JCI 173 powder support is also available as a cost-effective adapter for the JCI 176 facilitating simple studies of powders using the JCI 155v5 instrument. Additional information on the JCI 170,172 and 173 is available upon request.



JCI 176 - sample support (textiles/synthetics /plastics/paper etc material tests)



JCI176 with JCI173 powder support installed

In the JCI 176, layer and fabric samples are mounted between two hinged flat 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 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

JCI 155v5 shown mounted on top of the JCI176 sample support (suitable for textiles/synthetics/plastics/paper etc material tests but can also be used for testing powder materials when a JCI173 is fitted within the JCI176)

SPECIFICATION FEATURES

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*

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