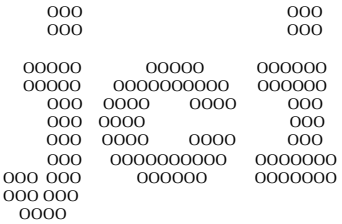

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USER MANUAL: JCI 150 Faraday Pail

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A compact unit for measurement of electrostatic charge on components and small quantities of powders and liquids

1. INTRODUCTION

The JCI 150 Faraday Pail is a compact instrument of low profile for reliable measurement of nett electrostatic charge on powders, liquids and small items. Charge received into the pail is measured using a JCI 178 Charge Measuring Unit with 20 and 200nC ranges of sensitivity. Charge is measured with a resolution down to 10pC. Readings are zeroed by a 'Zero' button on the JCI 178 or via a remote push button.

The JCI 150 unit comprises a Faraday Pail supported on high quality insulation. The assembly and its parts are shown in Figures 1 and 2. Connection from the pail to a virtual earth charge measurement unit is made via cable connection to the BNC connector.

The charge appearing on the outside of the pail is equal to the nett quantity of charge placed into the pail. It is not necessary that the charge introduced actually conducts to the pail, so measurements are equally applicable to insulating materials and conducting components placed into the pail. The shield over the pail ensures that measurements are little affected by nearby static charges on people or surfaces.

The sensitivity and performance of the JCI 150 Faraday Pail may not be as high as the JCI 147 unit but it is more suitable for measurements in confined spaces and where head height is limited – such as in a JCI 191 Controlled Humidity Test Chamber. It is also easier to ensure that all the material to be tested enters the pail. If there is any doubt about the quality of the electrical insulation this may be tested by observing how quickly readings drift with time after zeroing and after charge has been introduced into the pail.

The shield and the pail can easily be removed for emptying the pail, for weighing the quantity of material that has entered the pail and for cleaning.

2. OPERATIONAL USE

For use the JCI 150 Faraday Pail needs to be rested on a flat surface and connected to a virtual earth charge measurement unit (such as a JCI 178) by a good quality cable with BNC connectors.

The earthed shield over the pail minimizes the influence of any static charges on surfaces nearby. However, it is wise for the operator to wear outer clothing that can dissipate static charge easily and to be bonded to earth to minimize charged surfaces near the shield aperture affecting readings. It is also wise to avoid insulating surfaces near the unit as these may become charged and this could affect readings.

The pail is not very deep compared to its diameter (a height to diameter ratio of about 0.63) so the top level of items, liquids or powder introduced should be kept low to ensure all charge introduced into the pail couples to the pail.

After initial switch-on of the charge measurements unit it is wise to check the stability of the zero setting and stability of readings. The stability of the zero setting may be checked by pressing the zeroing button on the JCI 178 (or equivalent unit) and then observing the reading over a period of several minutes.

The quality of the insulation of the Pail may be checked by introducing some charge into the Pail and then observing the rate of drift of the reading. If the rate of decay of the reading after charge introduction is greater than about 10% in 5 minutes it may be appropriate to clean the Pail insulators. The Teflon insulation supporting the Pail easily becomes charged when rubbed. This charging may be minimized by using, for example, isopropanol for cleaning.

In making measurements it is important to check and record the pre-test 'zero' reading.

If charge is to be measured on items slid down a surface (e.g. semiconductor devices slid down a shipping tube) it is important to connect the sliding surface to earth and make the measurements shielded from any local charges and electric fields.

3. CALIBRATION

By using a virtual earth charge measurement unit the measurements are essentially independent of the capacitance of the pail and the connection cable. Calibration may be performed using a known value capacitor, for instance 10nF, connected to earth on one lead. If the capacitor is then charged to a known voltage, for instance 1V, and then, after disconnection from the voltage source, there will be a transfer of a known quantity of charge, for instance 10nC for 10nF and 1V, at contact to the pail. Formal calibration is made to the procedures outlined in British Standard BS 7506: Part 2: 1996.

4. SPECIFICATION FEATURES

JCI 150 dimensions:	? 130mm dia baseplate 95mm high ? 60mm dia pail, 38mm high. 60mm aperture in shield ? Weight: about 1½ kg
Sensitivity with JCI 178:	? 20 and 200 nano-Coulombs full scale 10pC resolution ? Sensitivity selected via on/off switch or by external control signal
Zero stability:	? Noise within $\pm$10pC. Zero stable $\pm$100 pC.
Accuracy and linearity:	? Within $\pm$5%FSD on JCI 178 display and analogue output
Response:	? -3dB at 35Hz.
Display on JCI 178:	? 3½ digit liquid crystal display of charge directly in nano-Coulombs with polarity and `LO BATT' indication
JCI 178 Audio alarm:	? Pulsing audio signal when above user set level
JCI 178 Controls:	? On/off slide switch: off - range 1 - range 2 ? Screwdriver set alarm threshold ? Screwdriver zero setting adjustment
JCI 178 Power supply:	? Replaceable PP3 battery ? via 8w mini DIN from external floating 12V supply ? 2.5mm d.c. power connector for 18v external floating power supply input
External connections:	? via 8w mini DIN connector: - analogue output signal ($\pm$2V FSD) - sensitivity range indication and sensitivity external control - earth - external power supply inputs ? 2.5mm 18V d.c. power input
Earth bonding:	? earth connection terminal on side of mounting frame

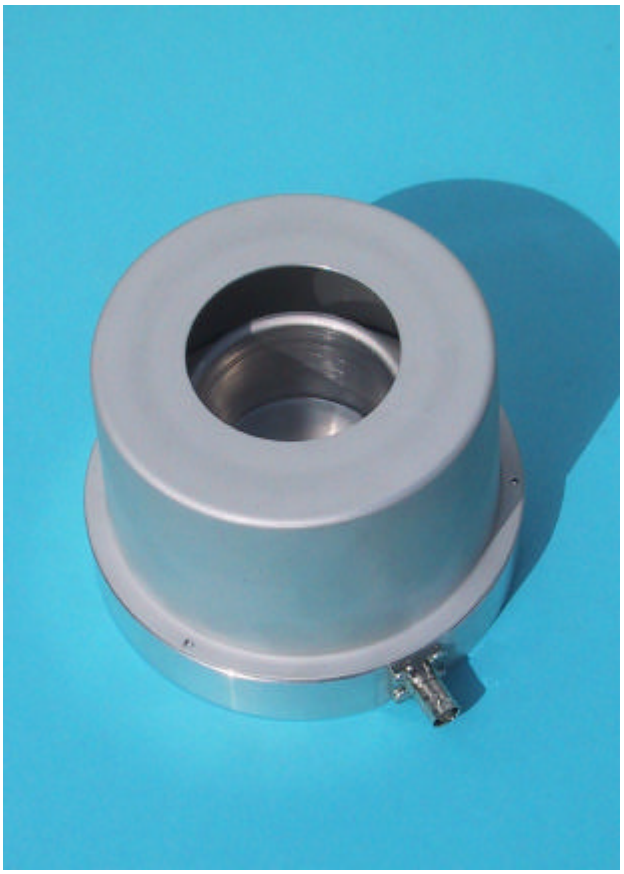

Figure 1: JCI 150 Faraday Pail assembly

Figure 2: JCI 150 Faraday Pail: baseplate, BNC connector, insulation, pail and shield