



## User Manual JCI 150 Faraday Pail

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## **WARNING**

**Please note that this equipment is not suitable for use where hazardous flammable atmospheres are or may be present (hazardous areas as defined in IEC 60079-10-1 and IEC 60079-10-2 inside or outside the equipment). Furthermore, even in the absence of designated hazardous areas, this equipment should not be used in close proximity to flammable substances without first conducting a risk assessment which is the responsibility of the end user company.**

## **CE Conformance**

### **Declaration of CE conformance**

Chilworth Technology Ltd, Beta House, Southampton Science Park, Southampton. SO16 7NS, UK declares, as designer and manufacturer of the JCI 140 Static Monitor, that the design and construction of these instruments conform to the requirements of the EC Directive on Electromagnetic Compatibility (EMC) 89/336/EEC to Standards EN 50081-1:1992 and EN 50082-1: 1992. These instruments also conform to the requirements of the Electrical Equipment (Safety) Regulations 1994 (S.I. 1994/3260).

Dr Stephen Rowe, for and on behalf of Chilworth Technology Ltd.



## **RoHS and WEEE Directives**

JCI Chilworth electrostatic measuring instruments are not required to conform to the RoHS Directive because they come within Category 9 exemption.

To comply with the requirements of the EC WEEE (Waste Electrical & Electronic Equipment) Directive all JCI Chilworth instruments, at the end of their useful life, should be returned to Chilworth Technology Ltd for disposal or recycling in an environmentally appropriate way. Chilworth Technology Ltd is a member of the Producer Compliance Scheme ECONO-WEEE Ltd registration number WEE/KB1414VU.

## PRODUCT WARRANTY

All test instrumentation supplied by Chilworth Technology Ltd., is manufactured to the highest specification, and as such Chilworth Technology Ltd., warrants the product against defects in materials and workmanship for a period of twelve (12) months from the date of receipt at the Customer premises, on a return to base policy.

It is a necessary requirement of the warranty conditions that the instructions given in the user manual are read, understood and adhered to before putting the instrumentation into first use. If any doubt exists, please consult the manufacturer for further assistance. In such cases where the product is returned to Chilworth Technology Ltd., we will inspect the product on receipt to diagnose the fault, and will issue the Customer with an inspection and condition report.

If the product proves defective during the warranty period, Chilworth Technology Ltd., at its option, will repair the product at our facilities in Southampton, UK.

Provided the product has been used in accordance with the manufacturers guidelines and that the fault is due to a manufacturing defect or component failure and is not due to expected wear and tear caused by the operating environment in which it is used, this warranty covers all parts and labour, but specifically excludes any consumable parts supplied with the product and any shipping costs to Chilworth Technology Ltd.

Chilworth Technology Ltd. shall not be obliged under this warranty:

- a) to repair damage resulting from attempts by personnel other than Chilworth Technology Ltd. representatives to install, repair or service the product unless directed by a Chilworth Technology Ltd. representative,
- b) to repair damage, malfunction, or degradation of performance resulting from improper use or connection to incompatible equipment or memory,
- c) to repair damage, malfunction, or degradation of performance caused by the use of non Chilworth Technology Ltd. supplies or consumables or the use of Chilworth Technology Ltd. supplies not specified for use with the product,
- d) to repair an item that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product or degrades performance or reliability,
- e) to perform user maintenance or cleaning or to repair damage, malfunction, or degradation of performance resulting from failure to perform user maintenance and cleaning as prescribed in published instruction/user manual,
- f) to repair damage, malfunction, or degradation of performance resulting from use of the product in an environment not meeting the operating specifications set forth in the instruction/user manual,
- g) to repair damage, malfunction, or degradation of performance resulting from failure to properly prepare and transport the product as prescribed in published product materials
- h) to replace items that have been refilled, are used up, abused, misused, or tampered with in any way;
- i) to support software not supplied by Chilworth Technology Ltd.;
- j) to provide software or firmware updates or upgrades.

In the maintenance of the product, Chilworth Technology Ltd. may use new or equivalent to new parts, assemblies or products for equal or improved quality. All defective parts, assemblies, and products become the property of Chilworth Technology Ltd.

Any additional service identified and provided by Chilworth Technology Ltd. at the Customer's request shall be invoiced to Customer at Chilworth Technology Ltd.'s current rates for parts, labour and travel.

***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. (Alternative sensitivity ranges for the JCI 178 are available). 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 for the operator 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 and to make readings relative to that.

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**

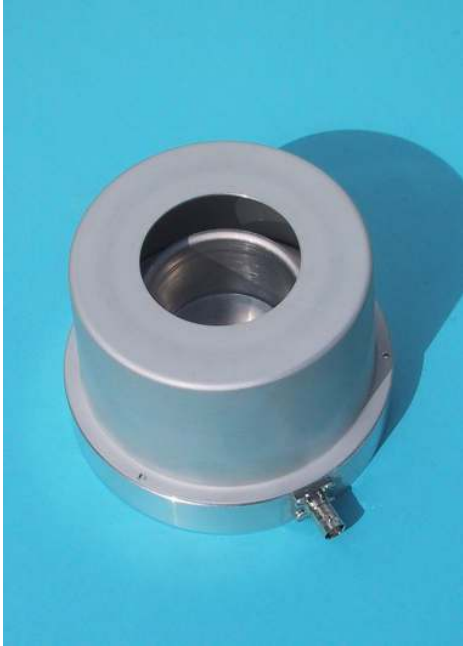
By using a virtual earth charge measurement unit the measurements are essentially independent of the capacitance of the pail and the connection cable.

Calibration may be performed using a known value capacitor, for instance 10nF, connected to earth on one lead. If the capacitor is charged to a known voltage, for instance 1V, and then, after disconnection from the voltage source, connected to the charge measurement input there will be a transfer of a known quantity of charge, for instance 10nC for 10nF and 1V.

Formal calibration may be made to the procedures outlined on the JCI Website [www.jci.co.uk/Calibration/Calibration.pdf](http://www.jci.co.uk/Calibration/Calibration.pdf).

## 4. Specification Features

- JCI 150 dimensions:**
- 130mm dia base plate 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  $\pm 10$ pC. Zero stable  $\pm 100$  pC.
- Accuracy and linearity:**
- Within  $\pm 5\%$ FSD on JCI 178 display and analogue output
- Response:**
- -3dB at 65Hz.
- 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 reading 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
  - 2.1mm d.c. power connector for 12V external floating power supply input
- External connections:**
- via 8w mini DIN connector:
    - analogue output signal ( $\pm 2$ V FSD)
    - sensitivity range indication and sensitivity external control
    - earth
    - external floating power supply input
  - 2.1mm 12V d.c. floating 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**

*JCI Chilworth manufactures a wide range of high quality, state of the art electrostatic instrumentation. We also carry out servicing and repairs for JCI instruments, and where appropriate calibration traceable to national and international standards. JCI Chilworth is part of Chilworth Global.*

*Chilworth Global brings together leading expert consultants in the fields of electrostatics and process safety, and GLP compliant laboratories, to provide a single point of contact for all electrostatic and process safety needs. Our laboratories provide material properties data for electrostatic problems and hazards, fire and explosion hazards (including liquids, vapours, gases and powders), chemical reaction hazards and regulatory testing. Our consultant engineers are all experienced in process safety, with individual expertise that includes electrostatics, chemical reaction hazards, and other particular aspects.*

## Contact Information ►

For further information on JCI Chilworth products and services visit:

**[www.jci.co.uk](http://www.jci.co.uk)**

**email: [sales@jci.co.uk](mailto:sales@jci.co.uk)**

Chilworth Technology Ltd  
Beta House, Southampton Science Park  
Southampton, SO16 7NS, UK

**Tel : +44 (0)23 8076 0722**

**Fax : +44 (0)23 8076 7866**

For Further information on Chilworth Global process safety services visit:

**[www.chilworth.co.uk](http://www.chilworth.co.uk)**

**email: [info@chilworth.co.uk](mailto:info@chilworth.co.uk)**