

JCI 148 Electrostatic Voltmeter

For accurate measurement of voltages with negligible current drain

The JCI 148 Electrostatic Voltmeter comprises a shielding enclosure in which an electrode, connected to the input, is supported by high quality insulation in a well defined and stable geometric arrangement relative to the sensing aperture of a JCI 140 Static Monitor. The geometry is such that the numbers shown on the display correspond directly to the applied voltage in kilovolts. The design, mounting and insulation of the high voltage electrode ensures low charge leakage even at the maximum operating voltage. The design also ensures there is negligible influence by any charge retained on the insulator surfaces.

The attraction of an electrostatic voltmeter based on the use of a 'field mill' type fieldmeter is the near zero current drain (limited only by insulation leakage, 10^{14} ohms or more), the high sensitivity (1V resolution up to 2kV), the low internal capacitance (about 7 pF) and the linearity of response. The frequency response is -3dB at 30Hz when using the standard JCI 140. The JCI 140F option provides a faster response, -3dB at 400Hz.

Analogue output signals are provided from the JCI 140 for separate display and recording of observations - for example using a multimeter, oscilloscope or paper chart recorder. A 'Picoscope' provides direct display and data logging on a microcomputer. This enable the full bandwidth capability of observations to be available for display with subsequent numerical processing via Spreadsheet software.

If there is any doubt about the quality of the electrical insulation this may easily be tested by placing some charge on the high voltage electrode and observing on the JCI 140 how quickly this leaks away. Performance may be checked up to about 1 kV by comparing the readings with those of a digital multimeter when connected to a suitable d.c. power supply.



The JCI 140 Static Monitor is easily removable from the mechanical arrangement and can be used in its own right for other measurement purposes.

Why bother about static?

Many materials, in particular plastics, easily become electrostatically charged when rubbed against other materials. Such 'triboelectric' charging causes problems in many areas of industry. It can cause ignition of flammable gases and give shocks to personnel. It can make thin films and light fabrics cling, attract airborne dust and debris, damage semiconductor devices and upset the operation of microelectronic equipment.

The risks and problems arising from static electricity are best avoided by ensuring that static charge can dissipate over and through the surfaces of materials and away to earth more quickly than charge is generated. For normal manual handling and body motion activities this means the charge decay is preferably below 1/4 second.

JCI 148 SPECIFICATION

Sensitivity:	<ul style="list-style-type: none">• 2,000 and 20,000 volts full scale• Sensitivity selected via on/off switch or by external control signal
Zero stability:	<ul style="list-style-type: none">• Noise within 1V p-p. Zero stable ± 10 volts.
Accuracy and linearity:	<ul style="list-style-type: none">• Within $\pm 2\%$FSD
HV connection:	<ul style="list-style-type: none">• special JCI HV connector with 2m HV cable
Maximum voltage:	<ul style="list-style-type: none">• 30kV safety limit
Response:	<ul style="list-style-type: none">• -3dB at 30Hz. (-3dB at 400Hz for JCI 140 F)
Internal capacitance:	<ul style="list-style-type: none">• about 7pF
Display:	<ul style="list-style-type: none">• 3½ digit liquid crystal display of surface voltage directly in kilovolts at 100mm with polarity and 'LO BATT' indication
Audio alarm:	<ul style="list-style-type: none">• Pulsing audio signal when above user set level
Controls:	<ul style="list-style-type: none">• On/off slide switch: off - range 1 - range 2• Screwdriver set alarm threshold• Screwdriver zero setting adjustment
JCI 140 Power supply:	<ul style="list-style-type: none">• Replaceable PP3 battery via 8w mini DIN from external floating 12V supply• 2.1mm d.c. power connector for 12v 'Wall Cube' external floating power supply input
External connections:	<ul style="list-style-type: none">• via 8w mini DIN connector:<ul style="list-style-type: none">- analogue output signal ($\pm 2V$ FSD)- sensitivity range indication and sensitivity external control- earth- external power supply inputs• 2.1mm d.c. power input
Earth bonding:	<ul style="list-style-type: none">• earth connection terminal on side of mounting frame
Dimensions:	<ul style="list-style-type: none">• 180x180 baseplate 330mm high without connector. Weight: about 3 kg
Option F:	<ul style="list-style-type: none">• provides fast response (3ms) to enable rapidly changing events to be examined and observations made on 50/60Hz voltages

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.

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