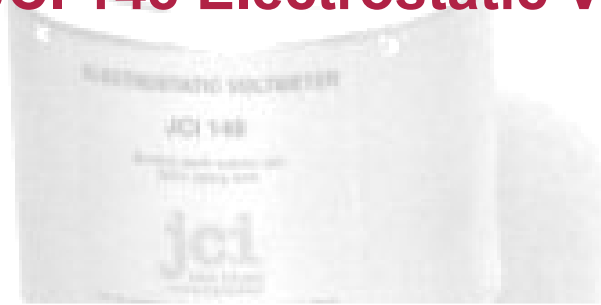


User Manual

JCI 148 Electrostatic Voltmeter



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User Manual

JCI 148 Electrostatic Voltmeter

The JCI 148 Electrostatic Voltmeter provides an accurate electrostatic voltmeter with linear response and polarity indication for voltages from 0 to 20 kV

1. Introduction

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 up to 20kV), the high sensitivity (1V resolution up to 2kV), the low internal capacitance (about 7 pF), the infinite input time constant and the linearity of response. The frequency response is -3dB at about 120Hz when using the standard JCI 140. The JCI 140F option provides a faster response, -3dB at 400Hz.

The JCI 140 Static Monitor is easily removable from the mechanical arrangement and can be used in its own right for other measurement purposes. All the normal features of JCI 140 and JCI 140F instruments are available for use - for example for external power supply input and for output to remote display and recording of observations.

2. Use of Electrostatic Voltmeter Unit

2.1 JCI 140 mounting

The JCI 140 is mounted into the unit by holding it between the fingers, on either side, and placing it with its sensing aperture end uppermost, obliquely into the channel between the two side plates so its top plate rests against the inside back surface. The JCI 140 is pressed up into position by two spring loaded fingers which may be pressed down either by a finger at the front or by lifting the lever at the back against the upper fixed stop. The bottom of the JCI 140 must be latched over the spring fingers and the lever is gently released. Check that the spigot around the sensing aperture of the JCI 140 is properly engaged into the hole in the baseplate of the Voltmeter unit and sits fully up into the mounting hole. The JCI 140 may be easily removed from the unit by depressing the spring supporting fingers either at the front or by the lever extension at the back.

2.2 Connections

The first connection to make to the unit is bonding to a reliable earth point from the earthing terminal on the backplate. If voltages over 20kV may occur it is wise to 'earth' directly to a good earth bonding point (for example a metal water pipe) and not via other instrumentation. If a spark breakdown occurs the discharge current may be quite large and will contain very high frequency transient signals. These could cause damage or interference. After earth bonding, the high voltage connector may be inserted and connected to whatever source is to be tested. It is also to be noted that a live disconnection of the of the high voltage probe lead (at either end) may cause some charge to be retained within the JCI 148. You must remember to discharge the high voltage part of the JCI 148 after use, otherwise you may get a spurious spark discharge when you re-connect the unit / go near the retained charge area.

Care needs to be taken about the selection and routing of the high voltage lead. The lead should have a suitably low leakage dielectric covering and have sufficient dielectric strength to avoid electrical breakdown to the highest voltages which may occur. None the less it is wise to route the lead away from other equipment, instruments and earthy surfaces. It is also desirable to avoid any rubbing of the cable against surfaces and to minimise any flexing. These actions are liable to generate static charges on the outside of the cable and this can couple into the connecting lead and degrade the quality of observations.

JCI 140 and JCI 140F instruments may be used with an external JCI142 power supply for long term continuous monitoring observations. The JCI142 power supply is 12V isolated from earth. Power is supplied to the instrument either via the 8w mini DIN connector or via the 2.1mm d.c. power connector in the back cover.

PC based digital data recording arrangements show great advantages for viewing and storing electrostatic observations with JCI 140 Static Monitor instruments. With such systems observations can be made to the full fast response capability of JCI 140F instruments and the data logging capability provides opportunity for detailed monitoring of long term observations. Compact and low cost units, with both digital storage oscilloscope and data-logging facilities, are available from Chilworth Technology. The software is Windows compatible.

2.3 Checking performance

PTFE is used as the insulation mounting the high voltage electrode to provide good quality mechanical and electrical characteristics. If there is any doubt about the quality of the electrical insulation (for example if the adaptor may have been exposed to dust and dirt) 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. This may be done with just the unit itself with the high voltage lead removed or for the whole test assembly. Measurements should be made at voltages close to the maximum likely to arise in practice so that possible losses by corona can be checked.

2.4 Cleaning

To keep the adaptor compact the unit has been designed so that at its maximum operating voltage internal electrical stresses approaches the breakdown strength of air - but with a reasonable margin. Dust and dirt within the adaptor may degrade the performance at the highest voltages by promoting corona or spark type discharges. If particulate matter may have entered the adaptor it will be best to separate the top plate assembly from the baseplate so the inside may be cleaned. This can be achieved by undoing the top or bottom four M2x4 countersunk screws holding the cylindrical wall to the end plates. The inside should be carefully cleaned using a lint free cloth with suitable solvent before reassembly. Care should be taken to avoid risk of rotation of the central electrode as this will change the adaptor calibration.

2.5 Calibration

The sensitivity may be checked at any time, up to 1 kV, by comparing the readings with those of a calibrated digital multimeter. Adjustment of sensitivity may be made by loosening the lock nut around the threaded portion of the high voltage bayonet connection pin and then adjusting the position of the central stem before relocking.

Formal calibration requires comparison of readings against a suitably stable and smooth high voltage supply that has been formally calibrated to National Standards.

3. 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.

4. JCI 148 Specification Features

Sensitivity ranges	± 1.999 and ± 19.99 kV FSD
Accuracy and linearity	within $\pm 2\%$ FSD on JCI 140 display and analogue output signal.
High voltage connection	special JCI HV protective connector
Maximum safe voltage	± 25 kV
Internal capacitance	about 7 pF
Earth connection	an earth connection terminal is provided on the unit sideplate.
Dimensions	- 180x180 mm baseplate 330 mm high without connector - total weight (with JCI 140) about 3 kg
JCI 140 controls	- 3 position slide switch in back plate: OFF: ON 2kV: ON 20kV - multiturn potentiometer zero set adjustment.
JCI 140 Display	3½ digit liquid crystal display with polarity and low battery indication. Display shows JCI 148 voltage directly in kV.
JCI 140 power supply	replaceable PP3 battery or external 12V floating power supply via connections to 8w mini DIN connector or via 2.1mm d.c. power connector.
Calibration	JCI 140/JCI 148 Electrostatic Voltmeter can be calibrated at JCI to BS 7506: Part 2: 1996 Annex using measurements whose accuracy can be traced to National Standards.

Declaration of CE conformance

Chilworth Technology Ltd, Beta House, Southampton Science Park, Southampton. SO16 7NS, UK declares, as designer and manufacturer of the JCI 148 Electrostatic Voltmeter, 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.

A handwritten signature in black ink, appearing to read 'S. Rowe', with a long horizontal stroke extending to the right.

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.

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

email: 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

email: info@chilworth.co.uk