

JCI 131 Electrostatic fieldmeter

A 'field mill' type electrostatic fieldmeter for precise, high resolution continuous measurement of electric fields in adverse environmental conditions



The JCI 131 Electrostatic Fieldmeter is a compact and robust instrument for the precise measurement of electric fields in adverse environmental conditions. It is particularly suitable for long term continuous monitoring of atmospheric electric fields - such as those associated with thunderstorm and volcano activity.

Electric field measurement sensitivities of 2, 20, 200 and 2000kV m⁻¹ are provided with high precision (better than 1%), low noise and a stable zero (both around 1V m⁻¹). Used as a potential probe, well away from nearby structures, the sensitivity is about 10kV m⁻¹ for 1kV of local space potential. The JCI 131 head unit requires a regulated power supply of 18-36V. This may conveniently be provided by operation in conjunction with a JCI 134 Base Unit.

Analogue output signals are provided proportional to the electric field at the sensing aperture as 2V for 2, 20, 200 or 2000kV m⁻¹. Indication is provided of the sensitivity range of operation and this can be forced to a selected range in remote operation. The zero setting can be adjusted remotely.

The JCI 131 is based on a proprietary JCI design of 'field mill' electrostatic fieldmeter which does not need earthing of the rotating chopper (IEEE Trans Ind Appl 26 (6) Nov/Dec 1990 p1178). This design, together with use of an electronically commutated drive motor, is appropriate for long term continuous monitoring.

Immunity to adverse environmental conditions is achieved using large (6mm) gaps from critical sensing surfaces to all other nearby surfaces, long insulation surface tracking paths and a sealed region for the signal processing circuit board. An additional circuit can be included to provide continuous monitoring of operational health when JCI 131 fieldmeters are used for long term measurements in onerous operating conditions - such as long term atmospheric electric field measurements. Operational health monitoring is achieved by modulating the voltage of a shield around the sensing head at a frequency of half the chopping frequency. The operational health signal is extracted by phase sensitive detection with no interaction to

the basic electric field signal. The health signal can then be compared to the signal expected.

Analogue output signals may be displayed on a JCI 134 or JCI 234 Base Unit and/or displayed and recorded on a microcomputer using a 'Picoscope' digital

storage oscilloscope. For monitoring atmospheric electric fields it is appropriate to mount the fieldmeter sensing head at the top of a pole – for example a JCI 137. With a 2m high mounting an ambient atmospheric electric field of 1kV m^{-1} will give a reading around 20kV m^{-1} .

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| Sensitivity ranges: | <ul style="list-style-type: none"> • 2, 20, 200 and 2,000 kV m^{-1} full scale • Sensitivity selected automatically or by external control signals |
| Zero stability: | <ul style="list-style-type: none"> • Noise within 1V m^{-1} p-p short term. • Zero stable $\pm 50\text{V m}^{-1}$ long term |
| Accuracy and linearity: | <ul style="list-style-type: none"> • Within $\pm 1\%$FSD of each operating range |
| Response: | <ul style="list-style-type: none"> • -3dB down at about 7Hz |
| Zero adjustment | <ul style="list-style-type: none"> • external adjustment by potentiometer between $\pm 1\text{-}2\text{V}$ regulated supply via 'zero adjust' connection |
| Controls: | <ul style="list-style-type: none"> • automatic selection of sensitivity range may be overridden by holding range indicating signal lines HI (+5V) or LO (earth) |
| Power supply: | <ul style="list-style-type: none"> • 18-36V 400mA smoothed d.c. supply |
| Connections: | <ul style="list-style-type: none"> • via 19w Mil connector on the back of the fieldmeter (Pattern 105. Socket: AB05 210014-19SN00 Free plug: AB05 602714-19PN00) |
| Signal outputs: | <ul style="list-style-type: none"> • 2.0V for 2, 20, 200 or 2000kV m^{-1} FSD for ranges 1, 2, 3 & 4. • Logic level indication of sensitivity range (0V or 5V LO/HI) |
| Mounting: | <ul style="list-style-type: none"> • on back of head unit 6 holes tapped M3 x 6mm deep on 95mm PCD and 6 holes tapped M3 x 6mm deep on 74mm PCD. (Connector casing within 39mm dia) |
| Operating environments: | <ul style="list-style-type: none"> • 0-40C, 0-100%RH including direct rain precipitation. |
| Earth bonding: | <ul style="list-style-type: none"> • via mounting and power supply cable |
| Dimensions: | <ul style="list-style-type: none"> • 100mm diameter, 250mm long. • Weight: about 3 kg |
| Calibration: | <ul style="list-style-type: none"> • the sensitivity is set up in manufacture on the basis of measurements whose accuracy is traceable to National Standards. Option for formal Calibration to BS 7506: Part 2: 1996 Annex A2 |

JCI 131 SPECIFICATION



Internal structure of JCI 131 electrostatic fieldmeter

HELP LINE

JCI Ltd 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 Ltd is the design, development, manufacture and marketing of high quality instruments for electrostatic measurements. JCI Ltd also carries out electrostatic testing of materials, consultancy and calibration of JCI instruments to BS 7506: Part 2: 1996.

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