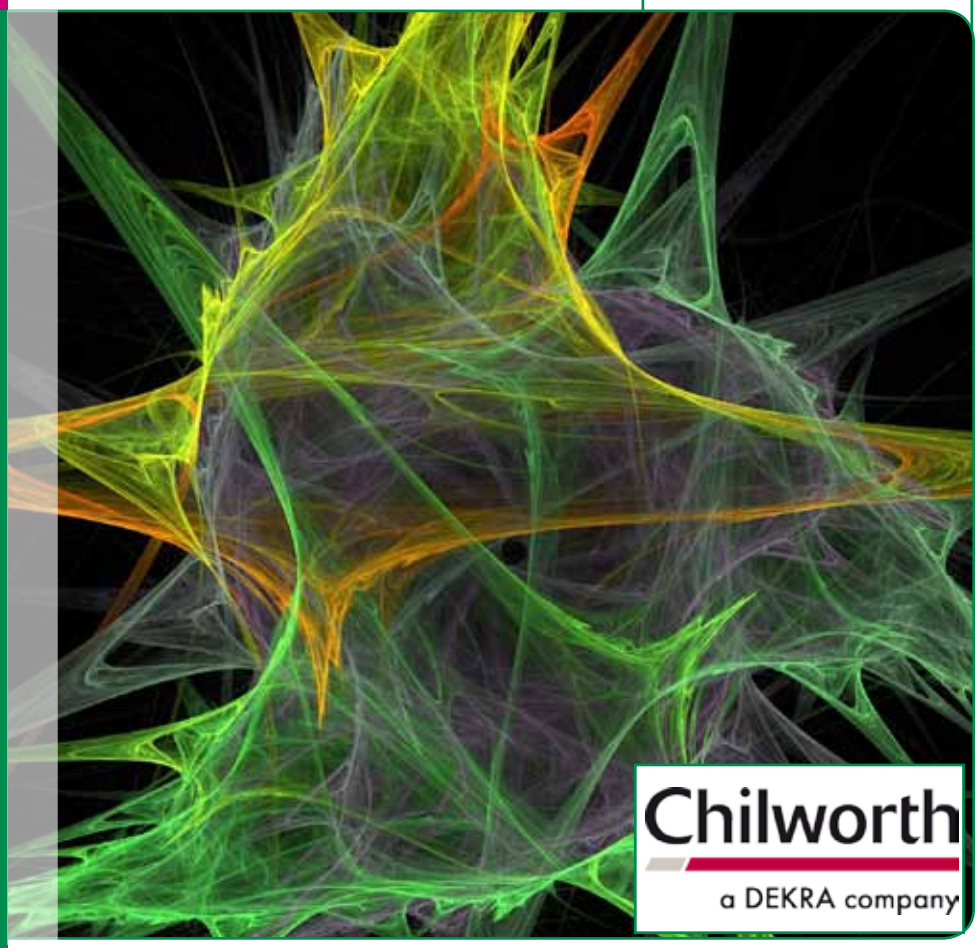
Electrostatic Instrumentation

The Measure of Static



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JCI Chilworth

the measure of static

JCI Chilworth are market leaders in the design and manufacture of quality, state-of-the-art electrostatic instruments and accessories calibrated to national and international standards.

As part of **DEKRA**, one of the World's largest safety organisations, we consult, manufacture and train widely in the fields of electrostatic measurement and process safety globally.

Our GLP compliant Electrostatics and Industrial Explosion Hazards laboratories undertake material property determinations which, in conjunction with expert advice from our Consultant Engineers, providing a single source for tailored solutions in the field of electrostatics.

Electrostatic expertise with worldwide reach

Our expert electrostatic technicians design and build a wide range of instruments

We provide:

- A comprehensive range of quality hand-held, portable & laboratory instruments
- UK based manufacture, design & instrument calibration to recognised EU & global standards
- Comprehensive servicing
- In-company GLP-compliant testing & expert process safety consultancy
- On-site, open-access & bespoke electrostatics training
- Regular maintenance and fault finding.

We serve clients in the following sectors:

- *Aerospace*
- *Pharmaceutical*
- *Meteorological*
- *Plastics*
- *Electronics*
- *Universities/Research Institutes*
- *Quality Assurance*
- *Defence*
- *Textiles*

In PDF versions of this brochure, dynamic links have been added to make your navigation easier. These are denoted by a bolded product code or description (as applicable).

Chilworth
a DEKRA company

JCI140 Field Mill Static Monitor

Including the JCI140F, JCI140X and JCI140XF

Benefits

- Indicates surface voltage up to 100mm away
- Resolution to 1V (standard version)
- Full scale 20kV (standard version)
- Extended range available for higher voltages
- Fast version available for high frequency AC fields (-3dB at 400Hz)
- Field mill technology avoids the zeroing required for Induction Monitors.

General Description

The JCI140 Static Monitor is a compact, easy to use instrument for direct non-contact measurement of surface voltage. It is available in 3 options ; F– Fast Response, X – Extended Range & XF which is a combination of the previous two options.
From a distance of 100 mm the 3½ digit liquid crystal display indicates surface voltage to an accuracy of 1 Volt. This makes it particularly easy to find even low levels of static charge and to make measurements with confidence.

As a field mill instrument there is no need to switch-on in a static free environment, no need for measurements to be made within a limited time and no need to worry about the influence of air ionisation – which are all concerns with simple 'induction probe' type instruments. The novel mode of operation of the JCI140, with no earthing of the rotor (the instrument must still be earthed), provides quiet, stable operation with fast response and long operational life.

The **JCI148** is a compatible modular voltmeter adapter for use with the JCI140. It allows direct measurement of voltages on live-conductors using a probe. The very high input resistance of this system eliminates the loading effects suffered by many high voltage voltmeters and high voltage adaptors for multimeters. The **JCI147** is a modular compatible **Faraday Pail** adaptor for use with the JCI140. It allows direct measurement of charge (in nano Coulombs) on items placed in the Faraday Pail.

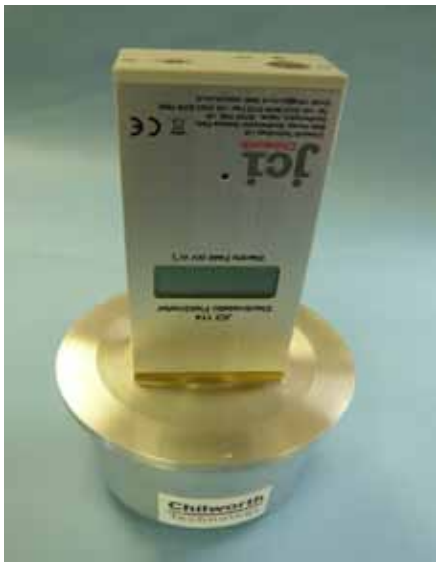
(continues overleaf)

JCI140 – Field Mill Static Monitor / Proximity Voltmeter (continued)

Including the JCI140F, JCI140X and JCI140 XF

Specification

Ranges:	2kV & 20kV full scale 1V and 10V resolution at 100mm (20kV & up to 200kV for JCI 140X / XF)
Response:	-3dB at ~120Hz for standard JCI140 -3dB at ~400Hz for JCI140F
Zero Stability:	Within ±10V on 2kV range
Accuracy:	Within ±2% FSD
Linearity:	Within ±1% FSD
Display:	3½ digit LCD indicating surface voltage in kilovolts at 100mm with polarity and 'LO BATT' indication
Audio alarm:	Pulsing audio output when reading above user set level
Signal outputs:	Via 8 pin miniature DIN socket
Power Supply:	PP3 Battery or JCI142 external mains adapter
Dimensions:	34x66x150mm overall. Weight: 320g.



JCI140 on JCI125 Zero Check Chamber

Accessories & Services

JCI143 Analogue Output Cable

JCI142 External Mains Adapter

JCI169 Permanent Mounting Feet

Digial USB Oscilloscope & Data Logger

Calibration to **BS7506:** Part 2:1996

JCI125 Zero Check Chamber

JCI140 with JCI1169 Feet

Modular Compatible Instruments

JCI148 Electrostatic Voltmeter

JCI147 Faraday Pail

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JCI148 Electrostatic Voltmeter

Compatible with **JCI140** Static Monitor

Benefits

- Measures voltage on conductors with near zero current drain
- High level of accuracy
- Measurements up to 20kV
- Can detect transient discharges during EMC testing.

General Description

The JCI148 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 **JCI140** Static Monitor. The geometry is such that the numbers shown on the display correspond directly to the applied voltage input in kilovolts.

The attraction of an electrostatic voltmeter based on the JCI140 Static Monitor proximity voltmeter is the near zero current drain (limited only by insulation leakage not less than 10^{14} Ohms at up to 20kV), the high sensitivity (1V resolution in 2kV range), the low internal capacitance (about 7pF), high input time constant and the linearity of response.

(continues overleaf)

JCI148 – Electrostatic Voltmeter

Specification

Ranges:	2kV & 20kV full scale. 1V and 10V resolution.
Accuracy and linearity :	Within ±2% FSD on JCI140 display and analogue output signal
High voltage connection:	Special JCI HV protective connector
Maximum safe voltage:	±25kV
Calibration:	JCI140 / JCI148 Electrostatic Voltmeter can be **calibrated** at JCI in accordance with the principles of BS7506: Part 2: 1996 Annex using measurements whose accuracy can be traced to National Standards.

Required Instrument

JCI140 Electrostatic Monitor

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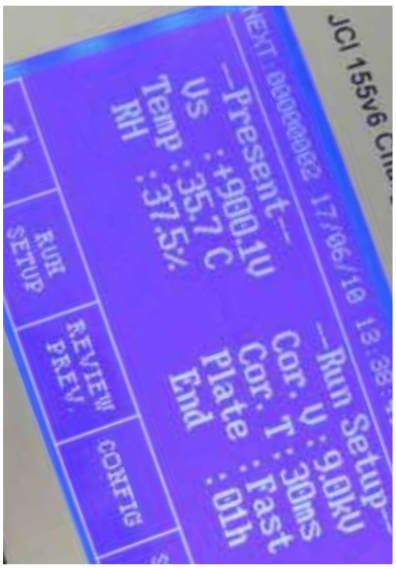
Benefits

- User friendly interface with simple setup of run parameters & results presentation
- On instrument graphical LCD display with dimmable back light
- Calculation and display of capacitance loading (in conjunction with **JCI176**)
- Portable, can be used with/without a PC
- Download and display test descriptions and upload test results to JCI Graph.



General Description

The JCI 155v6 is a compact instrument for easy, direct measurement of a material's ability to dissipate static electricity and assess whether significant voltages will arise from practical amounts of charge transferred to the surface. The version 6 is the latest in our highly successful and unique range of Charge Decay Time analysers. A high voltage corona discharge deposits a patch of charge on the surface of the material and a fast response electrostatic fieldmeter measures the voltage generated by this charge. It also measures how quickly this voltage falls as the charge migrates away. Corona charging is a simple way to simulate practical charging events, allowing control of initial surface voltage and charge polarity applicable to all types of surfaces - whether uniform or with localised conducting features. It provides consistent, reproducible results that are not affected by corona exposure.

An intuitive, user friendly display now includes a large LCD screen for both textual and graphical presentation of results using just 5 menu driven active operator keys.

Full versatility in setting configuration and test parameters is provided by the instrument firmware and display and the analyser may be used independently or connected via USB link to our proprietary associated JCI Graph PC software.

(continued overleaf)

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Specification

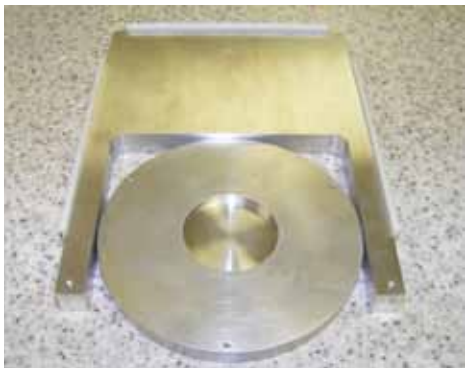
Power : Internal re-chargeable batteries, supplied with external AC adapter.

Display: Large Interactive LCD Display (112x60mm)

Test area: 45x54mm aperture in instrument baseplate.

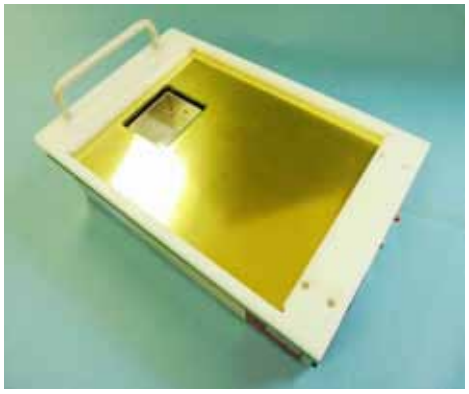
Sample: The unit may be placed directly on a surface or area of sample.
The JCI166 Sample Support Unit provides a simple support for open and earthed backing tests of films.
The JCI176 Charge Measuring Sample Support provides open and earthed backing support for film & layer samples up to 5mm thick with measurement. of the corona charge received by the sample.
Powders and liquids may be studied using a JCI173 in the JCI176.

JCI170 & 172 Sample Support



JCI155v6 on JCI176 Calibrator

JCI176 Sample Support



Accessories & Services

JCI Graph Software

JCI170 & JCI172 Sample Support

JCI166 Sample Support

JCI176 Sample Support

JCI255 Calibration Unit

JCI173 Powder/Liquid Support Insert

Calibration to **BS7506**: Part 2:1996

Using a JCI155 with a JCI176 Charge Measuring Sample support allows measurement of the corona charge received by the sample and calculation of the 'Capacitance Loading' experienced by charge on the surface related to the maximum surface voltage created by a given quantity of charge on a surface. A high capacitance loading means only low surface voltages arise per unit of charge.

Powder samples are presented using the JCI170 Powder Sample Support with the JCI155v6 supported by a JCI172 Support Plate. The JCI170 can be easily put in place and removed so that the base plate of the JCI155v6 stands off a few millimeters to reduce risk of powder dispersal to the air by action of the air dam.

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JCI176 Capacitance Loading Sample Support

Compatible with **JCI155** Charge Decay Time Analyser

Benefits

- Enables effective Capacitance Loading measurements to be made
- An optimal support and presentation of fabric and film samples
- Enables open and closed back measurements
- Can be used for powder & liquid studies using the JCI173 Insert.

General Description

The JCI176 Capacitance Measuring Sample Support provides opportunity to measure how much corona charge is received by the sample during corona charge decay testing with JCI155 Charge Decay Test Unit.

Such measurements enable calculation of the 'capacitance loading' experienced by charge on materials. This is relevant to assessment of the suitability of materials in terms of the surface voltages likely to arise and for how long.

Further to this the JCI173 powder support is also available as a cost-effective adapter for the JCI176 facilitating studies of powders or liquids using the JCI155 instrument.

Key Features

Conducted charge:	1V per 125nC and 1V per 1000 nC
Induction charge:	1V per 12.5nC and 1V per 100nC
Power Supply:	By direct cable connection to JCI155v6

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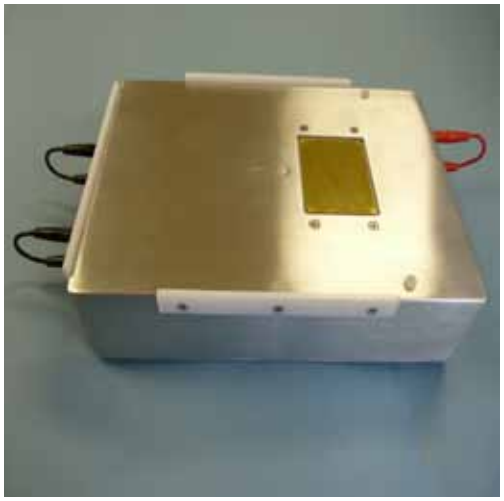
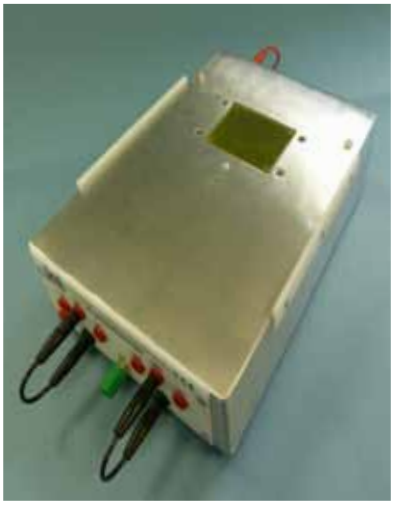
JCI255 Charge Decay Calibrator

Compatible with **JCI155** Charge Decay Time Analyser

Benefits

- Enables regular calibration and health checking of **JCI155** instrument
- Reduces external calibration costs
- Easy to use and maintain – simply keep it clean
- The JCI255 only requires annual calibration.





General Description

Chilworth recommends that the **JCI155v6** Charge Decay Analyser (and earlier JCI155 models) be formally calibrated at least every 12 months to confirm their sensitivity for surface voltage measurement and decay time measurement performance. However for many in-house quality procedures, calibration is required much more frequently.

The **JCI255** Calibrator Unit conveniently enables the required level of in-house **calibration** following the general principles set out in BS7506: Part 2: 1996. Minimal down-time is required and your **JCI155** need not leave your site.

The JCI255 Calibrator Unit is calibrated before dispatch and supplied with formal in-situ calibration of the resistors and capacitors inside the unit. The calibration unit itself should be formally recalibrated at 12 month intervals so the values of resistors and capacitors provide measurements of decay times that are traceable to National Standards.

Key Features

Capacitance Nominal Values (nF):	1, 10, 100, 1000
Resistor Nominal Values (MW):	10, 100, 1000
Decay Time Nominal Values (s):	0.01, 0.1, 1, 10, 100, 1000

Benefits

- Dispalys the electric field at the sensing aperture
- Resolution to 10V/m (20kV/m range)
- Ranges to 200kV/m
- Analogue output for data capture
- Suitable for measuring 50-60Hz AC fields & DC fields.

General Description

The JCI 114 is a compact sensitive instrument for the measurement of electric fields. Sharing the same field mill technology as the **JCI140**, there is no need to switch-on in a static free environment, no need for measurements to be made within a limited time and no need to worry about the influence of air ionisation.

The electric field sensitivity at the sensing aperture can be switched between 20kV/m and 200kV/m full scale. Measurements are shown on a 3½ digit LCD with decimal point and low battery indication. An audible alarm gives warning of any electric fields above a user set threshold level.

(continued overleaf)

Specification

Sensitivity:	20kV/m & 200kV/m full scale.
Response:	-3dB at ~120Hz for JCI114
Noise:	Within 0.04kV/m on 20kV/m range (within 4mV pk-pk on analogue output)
Zero Stability:	within ±0.05kV/m on 20kV/m range
Accuracy:	within ±2% FSD
Display:	3½ digit liquid crystal display of electric field in kV/m at sensing aperture with polarity and 'LO BATT' indication
Power supply:	PP3 replaceable battery / JCI142 External Mains Adapter
Dimensions:	34x66x150mm overall. Weight: 320g

Accessories & Services

JCI143 Analogue Output Cable

JCI142 External Mains Adapter

JCI169 Permanent Mounting Feet

Digial USB Oscilloscope & Data Logger

Calibration to **BS7506:** Part 2:1996

JCI125 Zero Check Chamber

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JCI131 Adverse Conditions Fieldmeter

Including the JCI 131F fast response version

Benefits

- Enables long term external measurement of electrostatic fields
- Durable stainless steel or brass case
- High accuracy and designed to withstand direct precipitation
- Can be used to determine ambient electric field
- Can be used as a local potential probe
- Fast response version can be used for field measurements near power lines.

General Description

The JCI131 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 thunderstorms, volcanic activity or power-lines.

Electric field measurement sensitivities of 2, 20, 200 and 2000 kV/m are provided with high precision (<1.5%), low noise and a stable zero. When used as a potential probe, well away from nearby structures, the sensitivity is about 10 kV/m for 1kV of local space potential, although critical applications should be underwritten by in-situ calibration.

The JCI131 may be used in conjunction with a **JCI134** Base Station which digitally displays the magnitude of the DC electric field at the sensing aperture.

The JCI131F (fast response version) is also available and has been developed for accurate measurement of electric fields near power lines. When used in conjunction with the **JCI234** base station, the AC field component in the range of 50-60Hz is displayed separately from the DC field component.

(continued overleaf)

JCI131 – Adverse Conditions Electrostatic Fieldmeter (continued)

Including JCI131F fast response version

Specification

Sensitivity ranges:	2, 20, 200 and 2,000kV/m full scale.
	Sensitivity selected automatically or by external control signals.
Accuracy & Linearity:	Within ±1.5%FSD of each operating range.
Response:	-3dB at about 3Hz for JCI 131, Response flat to 70Hz for 131F.
Environments:	0-40C, 0-100%RH including direct precipitation.

Accessories & Services

100m Cable

JCI137 Support Pole Assembly

JCI152 Zero Check Chamber

Calibration in general accordance with BS7506: Part 2:1996

Compatible Instruments

JCI134 base station (for JCI131)

JCI234 base station (for JCI131F)

For further information or a quotation, call us on +44 (0)23 8076 0722 email us at: jci@chilworth.co.uk or visit www.chilworth.co.uk

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JCI134 & 234 Base Stations

Compatible with **JCI131** and 131F Fieldmeters

Benefits

- Provides LCD display for DC electrostatic field from the **JCI131**
- Directly indicates ambient electric field following set-up
- LCD indication of 50-60Hz AC field for the **JCI131F** (JCI234)
- Regulated power provided to JCI131 sensor
- Remote zeroing facility for the JCI131
- Geometric scaling facility for ambient electric field
- Signal and range bit outputs for data logging.

General Description

The JCI131 fieldmeters may be operated in conjunction with a JCI134/234 Base Unit which provides power and displays DC electric field measurements (both ambient atmospheric and local field). These base stations also provide an indication of operational health status (where fitted).

The JCI234 is an enhanced version of the **JCI134** Base Unit and in conjunction with the fast response fieldmeter (**JCI31F**) provides the ability to resolve and measure both quasi-continuous electric fields and superimposed 50/60 Hz alternating electric fields which are viewed on an additional display.

The JCI131 and JCI134/234 can be operated from the separate mains input power supply or from a 12 V battery for un-interruptible power supply.

(continued overleaf)

JCI134 & 234 Base Stations – (continued)

Power supply:	separate mains power supply (supplied), and/or - 12V battery with at least 4 A capability (for starting) into two 4mm sockets (battery, cable and 4mm plug connectors not supplied).
JCI131 connection:	19w connector (Pattern 105 AB05 210014-19SN00) in end cover to take cable to JCI131
Signal outputs:	25w D type connector for direct connection to all input and output signals on 19w cable together with operational health and alarm status signals.
Connections are:	15w D type connector for connection to data recording and pro cessing systems. Signals are span adjusted and level shifted to suit certain data logging systems.

Required Instruments

JCI131 Fieldmeter (for JCI134)

JCI131F Fieldmeter (for JCI234)

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JCI191 Controlled Humidity Test Chamber

Including the JCI192 Dry Air Supply

Benefits

- Easy to use, common sense controls
- Allows preconditioning of samples prior to test with **JCI155v6**
- Max humidity range 15%RH to 65%RH
- Temperature range = Ambient ±10°C.

General Description

The JCI191C is a regulated test chamber that provides, in conjunction with the **JCI155v6**, the opportunity to measure the charge dissipation and capacitance loading capabilities of materials under defined humidity conditions with measurement of temperature and humidity. Humidity can be controlled and measured from 65% down to below 15%RH. Temperature can be controlled to ±10°C around ambient.

The JCI192 (sold separately) is used in conjunction with the JCI191C and provides it with a low pressure flow of very low humidity air via a push-in connector for 6mm airline plastic tube. This tube (typically 3m long) can be connected directly to the input push-in connector on the control box of the JCI191. The supply pressure is set to operate over an output pressure range between about 0.05 and 5p.s.i. Tyically the air normally has a dewpoint of -35ºC or less.

(continued overleaf)

JCI191 – Controlled Humidity Test Chamber (continued)

Including the JCI192 Dry Air Supply

Specification

Chamber size:	600x700x300mm (internal dimensions)
Humidity control:	From 15%RH to 65%RH
Accuracy:	±3.5%(RH) for Humidity & ±2.5°C for temperature at the extremities of the above measurements
Controls:	Push buttons to enable target humidity and temperature levels to be set with potentiometer
Dry air supply:	Standard 6mm push-in plastic tube connector Dry air supply 0.1SCFM .
The JCI191c power supply:	Mains power is connected via an IEC connector on the Control Box. Operation from 240V 5VA supplies. External supply should be fused 3A.

Compatible Instrument

JCI192 Dry Air Supply

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JCI1178 including the JCI178X Extended Range Measurement Unit

Benefits

- Hand held with full scale to 200nC (standard version)
- Highly portable with mounting feet option for permanent installation
- Single coax connection to **JCI150** faraday pail
- Battery or mains powered via JCI142 External Mains Adapter
- Resolution improved to 10pC (standard version).
- Extended range version available with a full scale of 200μC.

General Description

The JCI 178 is a compact instrument for the sensitive measurement of charge in the range 10pC to 200nC. A special low sensitivity version, the JCI178X , can be custom manufactured giving the operator the capability to measure up to 200μC.

For measurement of charge transfer in electrostatic discharges the unit can be fitted with a JCI179 shielded probe. This ensures that observations can be interpreted with confidence and valid judgments made on the risk of ignition presented in relation to quantities of charge transferred.

(continued overleaf)

JCI178 Including the JCI178X Extended Range Meaurement Unit

Specification

Sensitivity range:	20nC & 200nC FSD for JCI178 20μC & 200μC FSD for JCI178X
Power supply:	PP3 replaceable battery JCI142 External Mains Adapter
Accuracy and linearity	Within ±5%FSD

JCI179 Spark Discharge Probe

Accessories & Services

JCI142 External Mains Adapter

JCI143 Analogue Output Cable

JCI169 Permanent Mounting Feet

Calibration to BS7506: Part 2:1996

Digital USB Oscilloscope & Datalogger

JCI150 Faraday Pail

JCI179 Spark Discharge Probe

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JCI147 Faraday Pail

Compatible with JCI140 Monitor

Benefits

- Measures charge on substances inserted into pail
- Detailed 1pC resolution (2nC range)
- **JCI140** instrument is removable for independent surface voltage measurements
- Assess electrostatic charge properties of pharmaceuticals and other powders
- Net charge measurement.

General Description

The JCI147 Faraday Pail is an accessory for use with the **JCI140** Static Monitor.

Together they make a sensitive instrument for precise and reliable measurement of electrostatic charge placed in the pail, with a resolution down to 1pC. The maximum measurement at this resolution is 2nC, however a 20nC range is available in the same instrument at the flip of a switch.

The unit comprises a Faraday Pail mounted on high quality insulation in a well-defined location relative to the sensing aperture of the JCI140 Static Monitor. Objects or substances placed in the pail raises the voltage of the pail a little, according to its capacitance. This increase in voltage is measured by the JCI140 and quantified as nC on the display.

Key Features

Sensitivity:	2 and 20nC full scale with 1pC resolution (2nC range).
	Sensitivity selected by rear panel switch or external control signal.
Accuracy & linearity:	Within ±5% FSD on display and analogue output.
Dimensions:	Overall 180x180mm baseplate, 335mm high.
	Pail 50mm diameter, 75mm high, 50mm aperture in shield.

JCI150 Faraday Pail

Compatible with JCI178 Charge Measurement Unit

Benefits

- Range of net charge measurement 0-200nC
- Compact and easy to use
- Single coax connection to **JCI178** charge measurement device
- Suitable for powders, liquids & solids.

General Description

The JCI150 Faraday Pail is a low profile faraday pail for reliable measurement of nett electrostatic charge on powders, liquids and small items. Charge received into the pail is measured using a **JCI178** Charge Measuring Unit with 20 and 200nC ranges of sensitivity. Charge is measured with a resolution down to 10pC. (Alternative sensitivity ranges for the JCI178 are available). Readings are zeroed by a 'Zero' button on the JCI178 or via a remote push button.

The JCI150 unit comprises a Faraday Pail supported on high quality insulation. 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.

Key Features

Sensitivity with JCI178:	20 & 200 nC full scale 10pC resolution (20nC range)
Zero stability:	Noise within +10pC. Zero stable +100 pC.
Accuracy and linearity:	Within ±5%FSD on JCI178 display and analogue output
Dimensions:	130mm dia base plate 95mm high
	60mm dia pail, 38mm high. 60mm aperture in shield

JCI Calibration Services

For **JCI114,131,140,147,148,155 & 178** Instrumentation

Benefits

- Calibration is conducted in accordance with the principles of BS7506: Part 2: 1996
- High level of accuracy
- In-house calibration equipment with accuracy traceable NPL standards.

General Description

At JCI Chilworth we calibrate our instrumentation to BS7506: Part 2: 1996, providing a high level of accuracy with uncertainties stated.

JCI Chilworth recommends that all JCI measuring instrumentation be calibrated at least every 12 months. In fact it is a requirement of many in-house quality procedures that formal measurements be taken using instruments with a valid calibration certificate.

For further details on the range of servicing, calibration and after-sales support available for the new JCI instruments, or our range of training and electrostatic consultancy services available globally, please email us at: jci@chilworth.co.uk or call us on: +44(0)23 8076 0722

NB

Calibrations are conducted in accordance with the principles of BS7506: Part2:1996.

All pictures are for indication only. Chilworth Technology reserves the right to change products and specifications without prior notice.

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