

JCI Instrumentation

The Measure of Static



Static Monitor

*Electrostatic
Voltmeter Adapter*

*Charge Decay
Time Analyser*

*Capacitance Loading
Sample Support*

*Charge Decay
Calibrator*

Field Meters

*Field Meter
Base Station*

*Lightning Warning
System*

*Humidity Test
Chamber*

*Charge Measuring
Unit*

Faraday Pails

*Data Acquisition
Modules*

*Custom Manufacturing
Services*

Calibration Services

Chilworth
a DEKRA company

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JCI Chilworth

the measure of static

JCI Chilworth are market leaders in the development 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, provides a single source for tailored solutions in the field of electrostatics.



Electrostatic expertise with worldwide reach



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

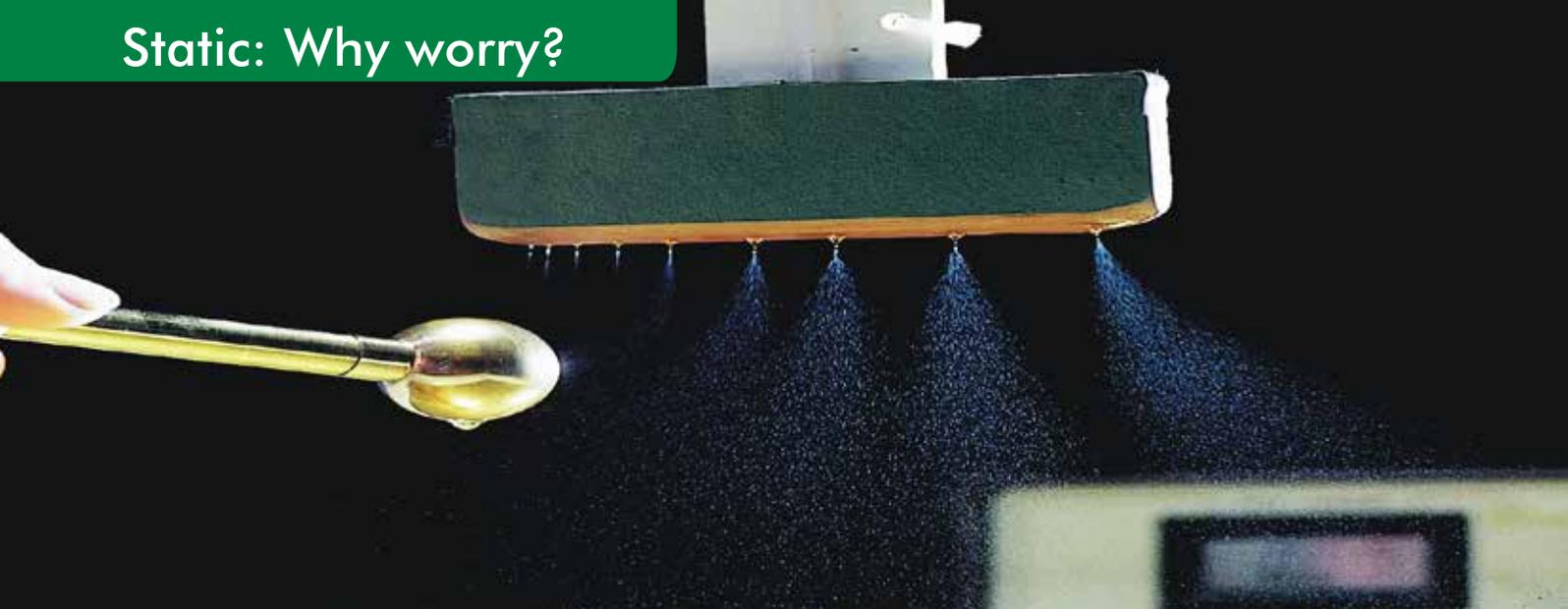
We provide:

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

We serve clients in numerous sectors, including:

- | | |
|------------------------------------|---------------------|
| - Aerospace | - Quality Assurance |
| - Pharmaceutical | - Defence |
| - Meteorological | - Textiles |
| - Plastics | - Coatings |
| - Electronics | - Films |
| - Universities/Research Institutes | - Chemicals |

Static: Why worry?



Why should you worry about static? It is perhaps easier to classify the importance of static under three headings: hazards, problems and applications. Understanding what this means for you and your business can help to influence the tools you need to measure static reliably, and how you can potentially solve your issues.

Typical Hazards

The most common and important hazard due to unwanted static electricity in industrial situations, is that arising from the possible ignition of flammable materials by electrostatic discharges. Under European and national legislation, such hazards must be addressed at the design stage (alongside other possible ignition sources). The effectiveness of any preventive, and/or protective measures, must be verified at the time of commissioning and then periodically reviewed throughout the life of the process and/or plant. To give an idea of the types of situations where electrostatic hazards can arise, a few examples are given below though clearly, of necessity, this can only touch the surface.

An operator was manually adding water to toluene already in a vessel, using a hose through an open manway. The exceptionally high charge generated by stirring a dispersion of water in toluene resulted in a discharge across the liquid surface, and ignition of the toluene vapour in the head space.

Addition of powder from a plastic sack through the manway in vessels containing flammable solvents, has been the source of many ignition incidents and continues to be a common hazard. Pouring the powder from the sack leads to charging of the plastic, resulting in a brush discharge to the vessel – just where flammable solvent vapour is emerging from the open manway.



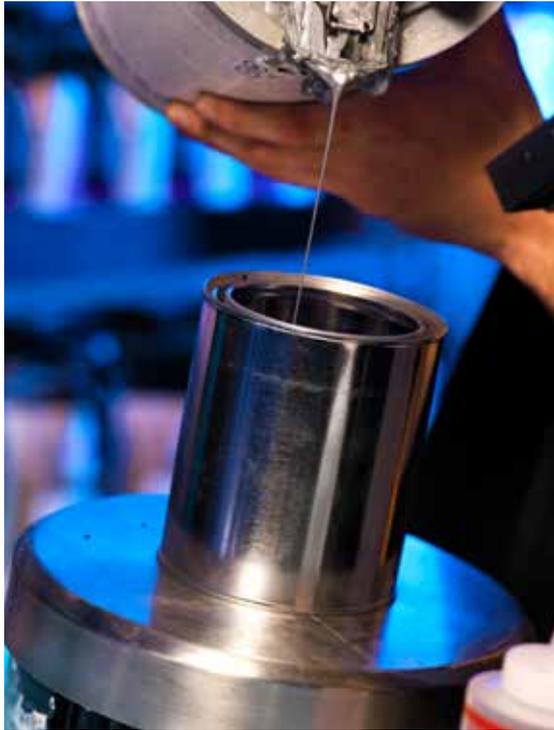
Without formal checks, sections of metal pipework can be isolated by the insertion of flexible hose sections or some types of section-to-section 22 seals. This is a common hazard that also applies to metal nozzles and lances on the end of flexible hoses. The isolated conducting pipe can become charged, leading to a spark discharge to an adjacent section or to other items of plant. Such discharges could well be incendive to any flammable atmosphere that might be present.

An operator put his hand into a lined container collecting tablets from a tablet compressor. He received such a powerful shock that he was unable to use his arm for much of the rest of the day. The tablets were charged, and collecting them in the container meant charge transferred to the inside of what turned out to be an insulating liner. With the earthed conducting container, this was exactly the configuration for a propagating brush discharge - the most powerful type of electrostatic discharge commonly encountered - and known to be capable of direct injury to personnel.

Static: Why worry?

Typical Problems

There are so many problems arising from unwanted static electricity that it would be quite impossible to list them all. However, certain types of problem arise repeatedly in many different guises.



i) Electrostatic Discharge

Electrostatic discharges can result in annoying shocks to personnel, damage to sensitive electronic components, and spurious alarms, to name but a few.

ii) Sticking

Many materials stick where they are not wanted as a result of static electricity. Powders stick in areas where seals are to be made, preventing effective sealing. Dust sticks to intermediate and finished products affecting quality and appearance. Small items, such as tablets and capsules, sometimes lift from conveyors and/or stick to machinery, disrupting production. Powders can stick inside containers making them difficult to get out. Textiles can also stick to machinery, and clothing clinging to the wearer is a common problem.

iii) Unwanted Trajectory

Materials in flight are sometimes attracted towards a surface such that they do not go where they should. Liquid and powder streams may not cleanly enter bottles and other containers, hitting the neck and running down the outside instead. In printing and coating inks can sometimes be drawn to areas other than those intended, leading to a reduction in print and coating quality. Plastic sheets that should stack simply slide off one another.

Typical Applications

Static electricity is used in an ever widening range of applications. This started nearly 100 years ago during development of electrostatic precipitators, now widely used to control particulates in flue gas from industrial furnaces and boilers, whilst the basic concepts of the ubiquitous photocopier and ink jet printer are entirely reliant on harnessing electrostatic effects. There are many other applications of static electricity, both fully developed & still in research and development. Static electricity can be used to temporarily hold items together (pinning), separate different materials from one another, or even separate coarse particles from fine particles of the same material.

Electrostatic forces on liquids can be harnessed to produce sprays of exceptionally narrow and controllable drop size spectrum, which have been used for high quality thin coatings, spray drying of fine powders (powder sprayed direct from solution can have particle sizes down to single microns or smaller), and even micro-encapsulation. Rotating electric fields can be used to selectively rotate some types of particle suspended in liquids (such as single cell organisms), opening the way to discrimination not obtainable in other ways. Static electricity can be used to apply surface finishes, such as liquid paints and dry powders (powder coating). Chilworth Technology's consultants have actively worked in all of the areas referred to above, but two applications are picked out below to give a little more detail.

A client needed to produce a very diffuse but very uniform powder deposition under full electronic control. A development programme, run entirely at Chilworth Technology, proved the concept first at bench scale and then pilot scale. A full scale prototype unit for installation on the client's production line has now been designed, built and installed for trials purposes.

Another client needed to demonstrate that a packaging material he wanted to use could be successfully separated from waste for recycling. Conventional separation techniques had failed to achieve the desired separation and electrostatics seemed a promising approach. Initial feasibility trials confirmed this, leading to a full development project at Chilworth Technology. The project reached a successful conclusion when a pilot scale unit was successfully designed and demonstrated. Using two electrostatic separation methods in series, this was able to automatically extract the client's material from real mixed plastic waste (from a recycling centre) to a purity of better than 99%.



JCI 140 Field Mill Static Monitor

Including the JCI 140F, JCI 140X and JCI 140XF



The JCI 140 is a compact instrument for easy detection and measurement of static electricity and for assessment of risks in practical situations.

Benefits

- Indicates surface voltage
- Resolution to 1V & full scale 20kV (standard version, used as per manufacturer's instructions)
- 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 JCI 140 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 - Fast Response Extended Range. 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 JCI 140, with no earthing of the rotor (the instrument must still be earthed), provides quiet, stable operation with fast response and long operational life.

The **JCI 148** and **JCI 146** are compatible modular voltmeter adapters for use with the JCI 140. Both instruments allow direct measurement of voltages on live conductors using a probe. The JCI 140, when used with the JCI 148, can measure voltages up to 20kV dc and the JCI 146 can measure voltages up to 60kV dc. The very high input resistance of these systems eliminates the loading effects suffered by many high voltage voltmeters and high voltage adapters for multimeters. The **JCI 147** is a compatible modular **Faraday Pail** adaptor for use with the JCI 140. It allows direct measurement of charge (in nano Coulombs) on items placed in the Faraday Pail.

JCI 140 – Field Mill Static Monitor (continued)

Including the JCI 140F, JCI 140X and JCI 140 XF

Specification

Ranges:	2kV & 20kV full scale 1V and 10V resolution at 100mm (20kV & up to 50kV for JCI 140X / XF, with precautions as per the manufacturer's instructions)
Response:	-3dB at ~120Hz for standard JCI 140 -3dB at ~400Hz for JCI140F
Zero Stability:	Within $\pm 10V$ on 2kV range
Accuracy:	Within $\pm 2\%$ FSD
Linearity:	Within $\pm 1\%$ 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 alarm level
Signal outputs:	Via 8 pin miniature DIN socket
Power Supply:	PP3 Battery or JCI142 external mains adapter
Dimensions:	34x66x150mm overall. Weight: 320g.

JCI 140 on JCI 125 Zero Check Chamber



Accessories & Services

- JCI 143 Analogue Output Cable
- JCI 142 External Mains Adapter
- JCI 169 Permanent Mounting Feet
- Digital USB Oscilloscope & Data Logger
- Calibration to BS7506: Part 2:1996
- JCI 125 Zero Check Chamber

JCI 140 with JCI 169 Feet



Compatible Modular Instruments

- JCI 148** Electrostatic Voltmeter
- JCI 147** Faraday Pail

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Compatible with **JCI 140** Static Monitor

The JCI 148 can be used for accurate measurement of voltages with negligible current drain.

Benefits

- Measures voltage on conductors with near zero current drain
- High level of accuracy
- Measurements up to 20kV
- Simple quick release mechanism for mounting the JCI 140 unit.



General Description

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 input in kV.

The attraction of an electrostatic voltmeter based on the JCI 140 Static Monitor 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.

JCI 148 – Electrostatic Voltmeter Adapter

Specification

Ranges:	2kV & 20kV full scale. 1V and 10V resolution
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:	$\pm 25\text{kV}$

Accessories & Services

Calibration to BS7506: Part 2:1996

Required Instrument

JCI 140 Static Monitor



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The JCI 146 is a voltmeter adapter component developed for integration into wider experiment systems

Benefits

- Direct live conductor measurement up to $\pm 60\text{kV}$ dc
- High accuracy measurement with no loading effects
- Low input capacitance
- Very high input impedance, low earth leakage system
- Can be used in a broader range of test measurement and research systems
- Optional battery powered and opto isolated data acquisition module available for remote monitoring of high voltage.



General Description

The JCI 146 is a voltmeter adapter component that is designed for integration into wider experiment systems. Used in combination with our world renowned **JCI 140**, the system enables live conductors with voltages up to $\pm 60\text{kV}$ dc to be measured through direct connection accurately within $\pm 2\%$ nominally with no loading effects on the equipment under test. Chilworth can also manufacture a 100kV dc measurement range voltmeter adapter with no loading effects on the measured voltage.

The JCI 146 high input impedance and low capacitance lends itself to more accurate measurements of high voltage dc. Other conventional techniques for directly measuring high voltages (e.g. high voltage meters, capacitive and resistive divider networks etc.) often give inaccurate results due to earth leakage. Leakage effects experienced with the JCI 146 are minimal.

This equipment is popular as a means of cross checking the calibration and accuracy of any high voltage generating source, with electric power companies, calibration test houses, EMC test houses, HV power supply manufacturers, HV relay manufacturers, HV capacitor and resistor manufacturers, cable testing companies and cable tester manufacturers to name but a few application areas.

JCI146 - High Voltage Adapter (continued)

For use with JCI 140 Static Monitor and JCI 165 Data Acquisition Module

Specification

Measurement :	Maximum Measurement Voltage ca 60kV dc
Input Impedance :	Not less than 4.7×10^{13} ohms at ± 50 kV
Input Capacitance :	32pF ($\pm 10\%$) (JCI 146 chamber only)
Installation :	Fixed Installation (permanent earthing attachment required)
Usage :	Used within Faraday cage environment (not supplied as standard)
Accuracy :	Nominally $\pm 2\%$
Attenuation :	1/10th of reading displayed on JCI 140
Optional :	JCI 165 opto-isolated USB data module for continuous logging of data to a remote laptop computer (refer to separate JCI 165 product entry) JCI Chilworth can provide an overall system package to meet your bespoke requirements.

Complete System Components supplied include the following :

- JCI 146 Voltmeter adapter
- JCI 146 High voltage unscreened cable
- JCI 140 Field Mill Static Monitor (optional)
- JCI 165 Data Acquisition Module (optional)



JCI 146 voltmeter adapter shown with JCI 140 static monitor and optional JCI 165 optoisolated USB data acquisition module and laptop (laptop not included)

Compatible Instruments

JCI 140 Static Monitor

JCI 165 Data Acquisition Module

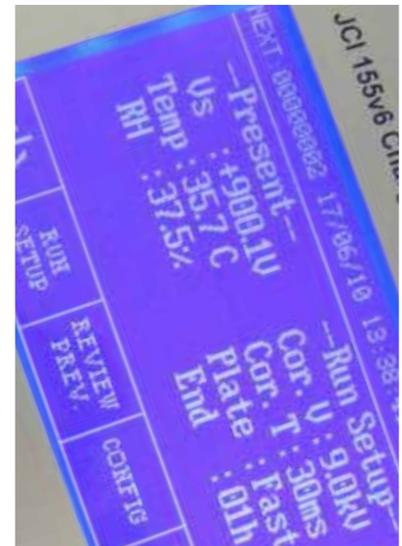


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The JCI 155v6 is a compact instrument for measurement of a material's ability to dissipate static electricity and in conjunction with the JCI 176 assess whether significant voltages will arise from practical amounts of charge transferred to the surface.

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 **JCI 176**)
- Portable, can be used with or 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, when used with the **JCI 176**, to 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. It is applicable to all types of surfaces - whether uniform or with localised conducting features and 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 a PC running our proprietary associated JCI Graph software.

Specification

Power : 18V dc external adapter supply derived from mains or batteries

Display: Large Interactive LCD Display (112x60mm)

Test area: 45x54mm aperture in instrument baseplate

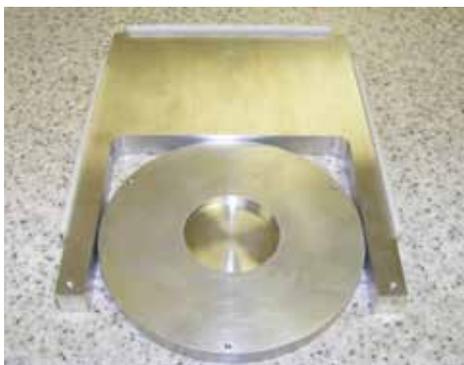
Sample: The unit may be placed directly on a surface or area of sample

Where the optional sample support unit is purchased this provides a simple support for open and earthed backing tests of films

JCI 176 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 (earthed and unearthed backing tests are also possible in the JCI 176 when testing films)

Powders and liquids may be studied using a JCI 173 in the JCI 176.

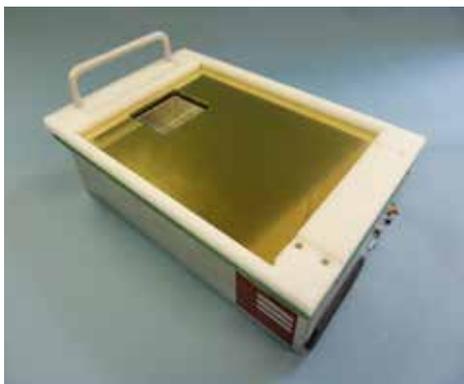
JCI 170 & JCI 172 Sample Support



JCI 155v6 on JCI 176 Sample Support



JCI 176 Sample Support



Accessories & Services

JCI Graph Software

JCI 170 & JCI 172 Sample Support

JCI 166 Sample Support

JCI 176 Sample Support

JCI 255 Calibration Unit

JCI 173 Powder/Liquid Support Insert

Calibration to BS7506: Part 2:1996

Using a JCI 155 with a JCI 176 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. A high Capacitance Loading means relatively low surface voltages for a given amount of charge, which will often be indicative of a less problematic material.

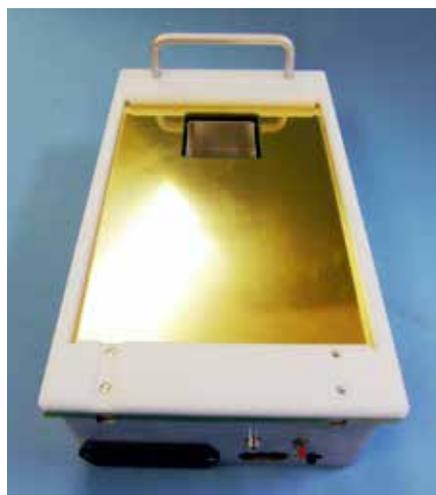
Powder samples are presented using the JCI 170 Powder Sample Support with the JCI 155v6 supported by a JCI 172 Support Plate. The JCI 170 can be easily put in place and removed so that the base plate of the JCI 155v6 stands off a few millimeters to reduce risk of powder dispersal to the air by action of the air dam.

Compatible with **JCI 155** Charge Decay Time Analyser

Sample support providing direct measurement of the quantity of charge transferred with corona charge deposition, allowing the JCI 155v6 to calculate and display capacitance loading.

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 JCI 173 Insert.



General Description

The JCI 176 Capacitance Measuring Sample Support provides opportunity to measure how much corona charge is received by the sample during corona charge decay testing with **JCI 155v6** 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 **JCI 173** powder support is also available as a cost-effective adapter for the **JCI 176** facilitating studies of powders or liquids using the JCI 155v6 instrument.

Power Supply:

By direct cable connection to JCI 155v6

Accessories & Services

JCI 170 & JCI 172 Sample Support

JCI 173 Powder/Liquid Support Insert

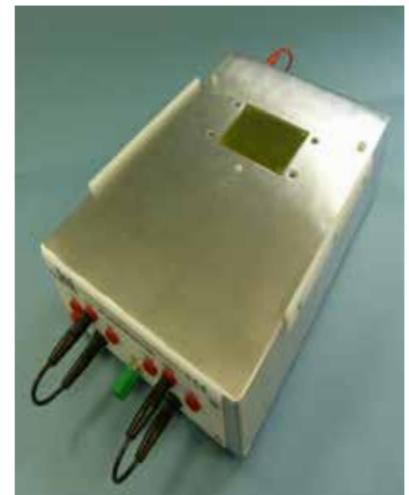
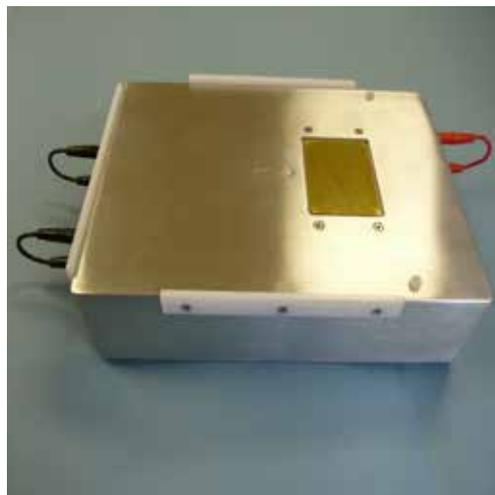


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For checking performance and for formal calibration of JCI 155v6 and JCI 155v5.

Benefits

- Enables regular calibration and health checking of **JCI 155** instruments
- Reduces external calibration costs
- Easy to use and maintain – simply keep it clean
- The JCI 255 only requires annual calibration.



General Description

Chilworth recommends that the **JCI 155v6** 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 JCI 255 Calibrator Unit conveniently enables the required level of calibration following the general principles set out in BS7506: Part 2: 1996. Minimal down-time is required and your JCI 155v6 need not leave your site.

The JCI 255 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.

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

The JCI 114 is a compact instrument for easy, sensitive and reliable measurement and monitoring of electrostatic conditions.

Benefits

- Displays 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 **JCI 140**, 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.

JCI 114 – Electrostatic Fieldmeter (continued)

Specification

Sensitivity:	20kV/m & 200kV/m full scale
Response:	-3dB at ~120Hz for JCI 114
Noise:	Within 0.04kV/m on 20kV/m range (within 4mV pk-pk on analogue output)
Zero Stability:	Within ± 0.05 kV/m on 20kV/m range
Accuracy:	Within $\pm 2\%$ 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 / JCI 142 External Mains Adapter
Dimensions:	34x66x150mm overall. Weight: 320g.



Accessories & Services

JCI 143 Analogue Output Cable

JCI 142 External Mains Adapter

JCI 169 Permanent Mounting Feet

Digital USB Oscilloscope & Data Logger

Calibration to BS7506: Part 2:1996

JCI 125 Zero Check Chamber



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Including the JCI 131F fast response version

The JCI 131 is a 'field mill' type Electrostatic Fieldmeter for precise, high resolution, continuous measurement of electric fields in adverse environmental conditions.

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 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 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 JCI 131 and JCI 131F (fast response version) of electrostatic fieldmeter may be used in conjunction with a **JCI 234** Base Station which digitally displays the magnitude of the DC electric field at the sensing aperture and also displays the AC field component in the range 50-60Hz separately from the DC field component when used with the "F" version for accurate measurement of electric fields near power lines.

JCI 131 – Adverse Conditions Electrostatic Fieldmeter (continued)

Including JCI 131F 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 $\pm 1.5\%$ FSD of each operating range
Response:	-3dB at about 3Hz for JCI 131, Response flat to 70Hz for JCI 131F
Environments:	0-40°C, 0-100%RH including direct precipitation.



Accessories & Services

100m Cable

JCI 137 Support Pole Assembly

JCI 152 Zero Check Chamber

Calibration in general accordance with
BS7506: Part 2:1996

Operational Health monitoring options also
available depending on requirements



Compatible Instruments

JCI 234 base station



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Compatible with JCI 131 and JCI 131F Fieldmeters

To run and display electric field measurements from both the JCI 131 & JCI 131F electrostatic fieldmeters. The JCI 234 resolves mains frequency electric field and superimposed quasi-continuous (DC) electric field signals from the JCI 131F (DC only measurements from the JCI 131).

Benefits

- Provides LCD display for DC electrostatic field from the JCI 131
- Directly indicates ambient electric field following set-up
- LCD indication of 50-60Hz AC field for the JCI 131F
- Regulated power provided both JCI 131 and JCI 131F sensors
- Remote zeroing facility for the JCI 131 and JCI 131F sensors
- Geometric scaling facility for ambient electric field
- Signal and range bit outputs for data logging.



General Description

The **JCI 131** and **JCI 131F** fieldmeters may be operated in conjunction with a JCI 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 JCI 234, in conjunction with the JCI 131F fast response fieldmeter, 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 JCI 131 and JCI 234 can be operated from the separate mains input power supply or from a 12 V battery for uninterruptible power supply.

JCI 234 Base Stations – (continued)

Power supply:	Separate mains power supply (supplied), and/or - 12V battery with at least 4A capability (for starting) into two 4mm sockets (battery, cable and 4mm plug connectors not supplied).
JCI 131 connection:	19w connector (Pattern 105 AB05 210014-19SN00) in end cover to take cable to JCI 131
Signal outputs:	25w D type connector for direct connection to all input and output signals on 19w cable. This cable can also support operational health and alarm status signals if optional operation health monitoring is purchased (refer JCI 131 and JCI 131F sensor accessories section)
Connections are:	15w D type connector for connection to data recording and processing systems. Signals are span adjusted and level shifted to suit certain data logging systems.

Required Instruments

JCI 131 Fieldmeter

JCI 131F Fieldmeter



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The JCI 180 Lightning Warning System is designed to warn of the short term risk of lightning in the immediate vicinity.

Benefits

- Provides 10 - 15 minute warning of possible lightning in the immediate vicinity
- Simple to set up and use - one of the most compact and light weight systems on the market today
- Rugged construction and compact design
- Can operate in temperatures from -10°C to +45°C
- Portable and easy to move or remain in fixed locations for up to a year with minimal maintenance
- Detection of storms in real time displaying lightning risks as green, amber, red warning alarm system
- Data monitored and continuously recorded by your computer
- Accurate device for electrostatic atmospheric condition monitoring for environmental and academic research.



General Description

The JCI 180 Lightning Warning System is your portable, flexible and cost effective lightning warning solution, deployable within minutes across diverse terrains and environmental conditions.

The class-leading stability and accuracy of our respected **JCI 140** field mill technology underpins this reliability. The JCI 180 sensor stand can also be fixed in a single or remote location for up to 12 months with minimal attention other than the use of an 'in-situ' laptop with power to download and store live or accumulating lightning data. This data can also be accessed by a remote wireless link where internet coverage is available.

Specification

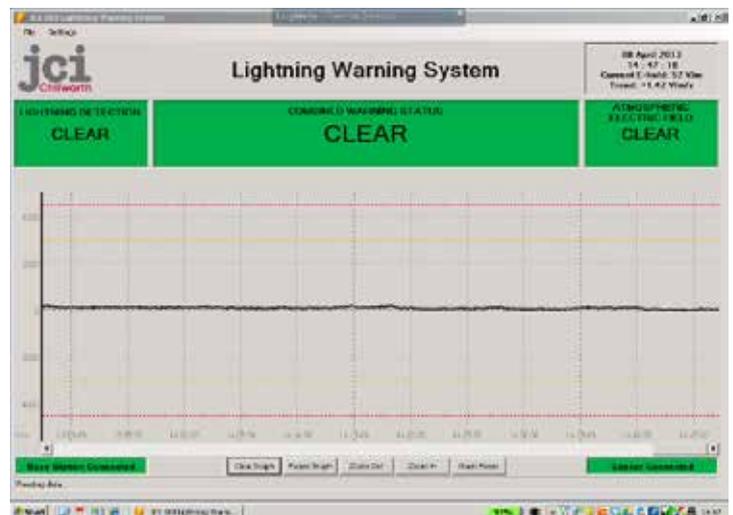
- Range : Detects lightning more than 20 miles away
- Temperature range : -10°C to +45°C (although will continue operating in -15°C to -20°C short term conditions)
- Software :
- Display of local electric and atmospheric fields
 - Continuous logging of archive data
 - Graph control buttons such as Pause, zooming, alarm reset
 - Diagnostic display – base station and sensor status
 - Alarm – green, amber, red alarm status
 - Set up screen to enable initial on site system calibration that is easily performed by an operator and permits Y intercept and Y scaling to be set (figures used to convert raw input data from the sensor to atmospheric electric field - alarms are derived from the latter)

Complete System Components supplied include the following :

- Sensor head
- Sensor stand main parts
- Sensor cable
- Base station
- Base station power supply
- Base station USB cable
- Earthing (grounding) spike
- Earthing (grounding) braid

The following minor parts may be separately identified:

- Sensor head stand fixings (screws, nuts, washers, etc)
- Tools (for sensor head stand fixings)
- Sensor head stand cable clips.



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

Including the optional JCI 192 Dry Air Supply

Permits the test environment temperature and humidity to be conditioned to enable charge dissipation and capacitance loading capabilities of materials to be measured using the JCI 155v6 under controlled conditions.

Benefits

- Easy to use, common sense controls
- Allows preconditioning of samples prior to test with JCI 155v6
- Relative humidity range 15% to 65%
- Temperature range = Ambient $\pm 10^{\circ}\text{C}$.



General Description

The JCI 191C is a regulated test chamber that provides, in conjunction with the **JCI 155v6**, the opportunity to measure the charge dissipation and capacitance loading capabilities of materials under defined humidity conditions with measurement of temperature and humidity. Relative humidity can be controlled and measured from 65% down to below 15%. Temperature can be controlled to $\pm 10^{\circ}\text{C}$ around ambient.

The **JCI 192** (sold separately) is used in conjunction with the JCI 191C 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 JCI 191C. The supply pressure is set to operate over an output pressure range between about 0.05 and 5 p.s.i. Typically the air normally has a dewpoint of -35°C or less.

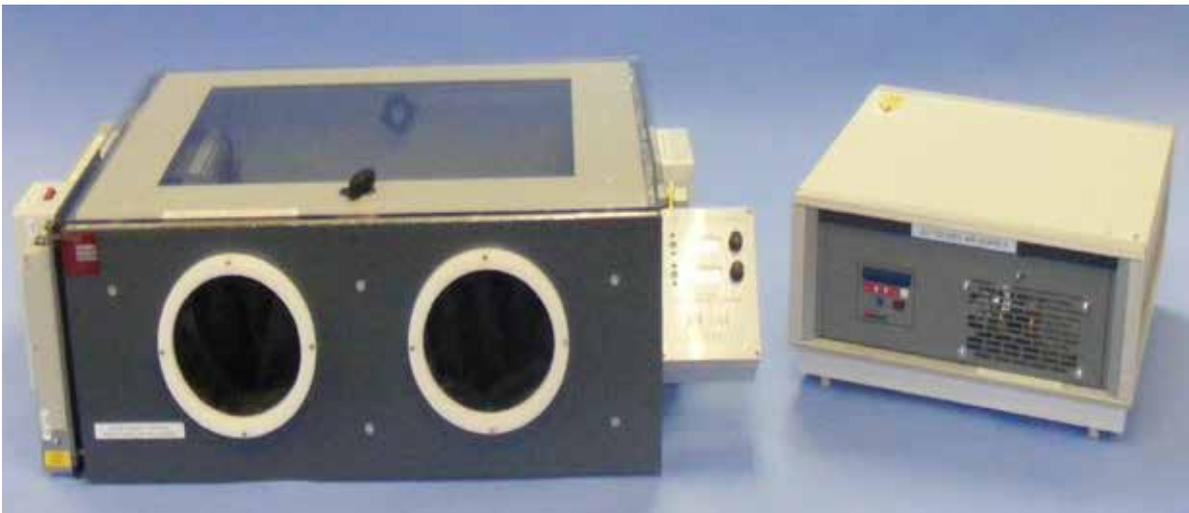
JCI 191 – Controlled Humidity Test Chamber (continued)

Including the optional JCI 192 Dry Air Supply

Specification

Chamber size:	600 x 700 x 300mm (internal dimensions)
Relative humidity control:	From 15% to 65%
Accuracy:	$\pm 3.5\%$ RH for humidity & $\pm 2.5^{\circ}\text{C}$ 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
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.

JCI 191C with optional JCI 192 Dry Air Supply



Compatible Instrument

JCI 192 Dry Air Supply



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JCI 178 Charge Measuring Unit

Including the JCI 178X Extended Range Charge Measuring Unit



For general measurement of small quantities of charge and, with the JCI 179, measurement of charge transfer in static discharges.

Benefits

- Hand held with full scale to 200nC (standard version)
- Highly portable with mounting feet option for permanent installation
- Single coaxial connection to JCI 150 faraday pail
- Battery or mains powered via JCI 142 External Mains Adapter
- Resolution 10pC (standard version)
- Extended range version available with a full scale of 200 μ C.



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 JCI 178X, can be custom manufactured giving the operator the capability to measure up to 200 μ C.

For measurement of charge transfer in electrostatic discharges the unit can be fitted with a **JCI 179** Spark Discharge 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.

JCI 178 Charge Measuring Device

Including the JCI 178X Extended Range Charge Measuring Unit

Specification

Sensitivity range :	20nC & 200nC FSD for JCI 178 20 μ C & 200 μ C FSD for JCI 178X
Power supply :	PP3 replaceable battery JCI 142 External Mains Adapter
Accuracy and linearity :	Within $\pm 5\%$ FSD.

JCI 179 Spark Discharge Probe



Accessories & Services

- JCI 142 External Mains Adapter
- JCI 143 Analogue Output Cable
- JCI 169 Permanent Mounting Feet
- Calibration to BS7506: Part 2:1996
- Digital USB Oscilloscope & Datalogger
- JCI 150 Faraday Pail
- JCI 179 Spark Discharge Probe



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The JCI 147 Faraday Pail is an accessory for use with the JCI 140 Static Monitor.

Benefits

- Measures charge on materials inserted into pail
- 1pC resolution (2 nC range)
- JCI 140 instrument is removable for independent surface voltage measurements
- Assess electrostatic charge properties of pharmaceuticals and other powders
- Net charge measurement.



General Description

The JCI 147 Faraday Pail is an accessory for use with the **JCI 140** 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 flick 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 JCI 140 Static Monitor. Objects or materials placed in the pail raise the voltage of the pail according to its capacitance. This increase in voltage is measured by the JCI 140 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 $\pm 5\%$ FSD on display and analogue output
Dimensions:	Overall 180 x 180mm baseplate, 335mm high Pail 50mm diameter, 75mm high, 50mm aperture in shield.

Compatible with JCI 178 Charge Measuring Unit

A compact unit for measurement of electrostatic charge on components and small quantities of materials when connected to the JCI 178.

Benefits

- Range of net charge measurement 0-200nC
- Compact and easy to use
- Single coaxial connection to JCI 178 charge measurement device
- Suitable for powders, liquids & solids.



General Description

The JCI 150 Faraday Pail is a low profile Faraday pail for reliable measurement of net 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. 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 net 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 JCI 178:	20 & 200 nC full scale 10pC resolution (20nC range)
Zero stability:	Noise within $\pm 10\text{pC}$. Zero stable to $\pm 100\text{pC}$
Accuracy and linearity:	Within $\pm 5\%$ FSD on JCI 178 display and analogue output
Dimensions:	130mm dia base plate 95mm high 60mm dia pail, 38mm high. 60mm aperture in shield.

Permits logging of data from up to 8 x JCI 140 Static Monitors simultaneously.

Benefits

- Single monitoring hub for up to 8 x JCI 140 Static Monitors
- Multiple logging of JCI 140s for electrostatics R&D applications
- Continuous powering for up to 8 x JCI 140s
- Fully compatible with electrostatic voltmeter and charge measuring accessories
- USB connectivity
- Proprietary graphical user interface and data logging package with range indication and signal averaging capability
- Custom cable lengths available
- Bespoke tailoring of software to meet specific application requirements available.



General Description

The JCI 167 has been developed to acquire, display and log data generated simultaneously by up to 8 **JCI 140** Static Monitors using a desktop or laptop computer (not supplied as standard) running Windows 7 or Windows 8 operating systems. This equipment has been developed in order to support the Research and Development demands of manufacturing and new product development, processing companies and universities.

The data acquisition and display software incorporates data processing functions appropriate to the user's application (tailor made solutions can be provided to meet individual customer's requirements). Hence both raw and suitably processed data can be viewed continuously and saved to the hard drive. Saved data can be readily imported into a spreadsheet for subsequent processing and analysis.

JCI 167 - Data Acquisition Module (continued)

Specification

Input:	8 x Analogue (0-2 Volt = 0-20kV) channels compatible with JCI 140 analogue signal cables (JCI 143)
Power supply :	12V power adapter supplied
Power ON/OFF :	Via Keyswitch
Communication :	Via USB 2.0
Design temperature :	10°C - 30°C
Ergonomics :	Neat compact unit, can be sited on an office desk or workbench
Fuse protection :	200mA channel fuse protection (internal 100mA resettable fusing)
Accuracy :	Within 2% of full scale reading
Size :	Channel identification leds indicating when each channel is ON
Cable(s) :	Analogue, with line functions to/from JCI 167 data module for : signal output, range flag, Ground reference (hence no need to connect each JCI 140 unit to a separate earth) and power supply.

System Components Comprise the Following:

- 8 x channel data acquisition module
- Power supply for the data acquisition module
- Up to 8 x JCI 140 static monitors can be supported
- Up to 8 x JCI 140 power and signal cables
- Computer JCI 167 software
- PC or laptop (*optional*)
- Optional mounting brackets for JCI 140 units specific to bespoke applications



Compatible Instrument

JCI 140 Static Monitor



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This device is compatible with the JCI 140 in combination with the JCI 146 and permits the user to observe and record high voltage data remotely to PC over an optically isolated USB link.

Benefits

- Fixed installation (permanent earthing attachment required)
- PC USB compatibility over optically isolated USB 1.1 connection permitting remote observation of high voltage
- Provides power to JCI 140 static monitor (requires separate earthing)
- LCD monitor for battery voltage
- Takes 10x C cell batteries for long battery based operation
- Small size can be installed in most labs conveniently
- Uses proven data logging technology.



General Description

The JCI 165 data acquisition module provides an interface between the **JCI 140** static monitor and a laptop PC thus enabling high voltage dc measurements to be carried out remotely via an optically isolated USB PC connection.

Key Features

- USB Oscilloscope computer software
- USB 1.1 optically isolated data acquisition module
- Nominal 12V power supply to JCI 140 integral within JCI 165 unit
- On board battery voltage monitor
- Miscellaneous leads supplied
- Optionally available – JCI 140 static voltmeter and JCI 146 high voltage adapter.



Full Instrument Design Engineering Service

At JCI Chilworth, our team of competent Instrument Design Engineers have gained skills through a broad experience of instrumentation, control and signal circuit design. We also have the added benefit of being able to draw on our extensive industry knowledge base available from our expert consultancy & laboratory testing staff, who often feed back improvement ideas for our existing product range and ideas for new custom instrumentation. Our aim is to always provide precision measuring solutions that work for you, whatever department you may work in, from Research & Development laboratories to Academic Institutions.

All of our bespoke instruments are designed with the following in mind;

- To have complete confidentiality throughout the design, testing and delivery process
- To ensure our clients needs are properly understood
- To include consultancy advice on how to best engineer a solution to your problem
- To build instrumentation of the highest standard
- To include extensive testing, prototyping and proof of concept
- To provide support and innovation services for ideas
- To encourage further development and concepts originating from the use of our product range.

Our custom manufacture service is an excellent solution if you require an instrument built to service a specific need, whether it is starting from scratch or, for example, updating equipment originally specified in an old but still useful test protocol. We have worked on many bespoke fabricated Process Safety instrument projects in the past, with some of our standard product range having originated from our custom manufacturing service. Examples include;

- JCI 146 High Voltage Adapter (see pages 11 & 12)
- JCI 180 Lightning Warning System (see pages 23 & 24)
- JCI 167 Data Acquisition Module (see page 31 & 32)
- JCI 165 Data Acquisition Module (see page 33)

Whatever your needs, please contact JCI Chilworth; initial discussions are complimentary and you will find us enthusiastic and highly receptive to ideas for new instruments or new applications for existing ones.

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 to 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.

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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