

# Jewel<sup>®</sup> Workstation Continuous Mini Monitor Operation, Installation, and Maintenance



Figure 1. Jewel<sup>®</sup> Workstation Continuous Mini Monitor.

## Description

Leading companies use continuous monitors as a cost effective component in satisfying the paragraph 5.2.7 requirements of EN 61340-5-2. The Charleswater Jewel<sup>®</sup> Workstation Continuous Mini Monitor continuously monitors the integrity of one operator and an ESD protective working surface's discharge path to ground. The Monitor will provide virtually instantaneous notification of static control equipment failures, eliminating the need of periodic testing and costly record keeping. This unit is highly cost effective as it is designed to monitor any conventional single conductor wrist strap and ground cord system. **There are no additional wires to connect and its small package makes it highly suitable to install on a working surface.**

Continuous Monitors pay for themselves, improving quality, productivity, and eliminating wrist strap daily testing and test result logging.

The Jewel<sup>®</sup> Workstation Continuous Mini Monitor is item number 99130.

Item #	Color	Voltage
99130	Sapphire	220 VAC

The Jewel<sup>®</sup> Workstation Continuous Mini Monitor is a Real Time instrument that ensures that critical ESD generators in a sensitive area are effectively grounded. It independently monitors the operator and the working surface. The instant an operator's wrist strap or cord fails, the monitor will issue audible and visual alarms alerting the user of the problem. In the same manner, the unit also confirms that an electrical discharge path to ground of less than 500 megohms exists from the ESD protective working surface. No user adjustment or calibration required.

## ADVANTAGES OF CONTINUOUS MONITORING OVER PERIODIC TESTING

Many customers are eliminating periodic testing and are utilizing continuous monitoring to better ensure that their products were manufactured in an ESD protected environment. Full time continuous monitoring is superior to periodic or pulsed testing, and can save a significant amount of money in testing costs and rejected product. Periodic testing detects failures after ESD susceptible products have been manufactured. The costs of dealing with the resulting catastrophic failures or latent defects can be considerable. Jewel<sup>®</sup> Workstation Continuous Mini Monitors eliminate the need for users to test wrist straps and log the results; by their function, these monitors satisfy the EN 61340-5 test logging requirement.

## WAVE DISTORTION DETECTION TECHNOLOGY PROVIDES TRUE 100% CONTINUOUS MONITORING

From all the technical alternatives available, Charleswater has chosen wave distortion technology for many of its Continuous Monitor product offerings. Wave distortion circuitry monitors current/voltage phase shifts and provides true 100% continuous monitoring. Electrical current will lead voltage at various points due to the combinations of resistance and capacitive reactance. By monitoring these "distortions" or phase shifts, the wave distortion Workstation Continuous Mini Monitor will reliably determine if the circuit is complete.

Wave distortion technology can be referred to "vector impedance monitoring". This description is valid as the wave distortion technology measures the impedance at the monitored banana jack and looks for changes in either the capacitance or resistance of the circuit which includes the wrist strap and its wearer. It uses filtering and time domain sampling to filter out false signals caused by voltage offsets, 60 Hz fields and other electro-magnetic and electrostatic interference.

In normal factory environments, and with persons whose capacitance with respect to ground is within design limits (1.5 meter tall 40.8 kilogram person to 1.83 meter 113.8 kilogram person), the Jewel<sup>®</sup> Workstation Continuous Mini Monitor cannot be "fooled". It will provide a reliable alarm only when the wrist strap or Working Surface becomes dysfunctional or unsafe according to accepted industry standards. The Jewel<sup>®</sup> Workstation Continuous Mini Monitor is drift-free and designed to be insensitive to the effects of squeezing or stretching the coil cord.

## ADVANTAGES OF WAVE DISTORTION AND SINGLE-WIRE TECHNOLOGY

The Jewel<sup>®</sup> Workstation Continuous Mini Monitor allows the use of any standard, single-wire wrist strap and coil cord. The monitor/wrist strap/cord system life-cycle costs are by far lower than alternative systems which require expensive and fragile dual-wire cords and special wrist straps. Dual-wire cords are expensive and are the weak link of the system, the most likely component to need replacement. Over a five year period, this can make the dual-wire system three times as expensive as a system utilizing single-wire wrist straps and cords. See Calibration Unit (page 3) to minimize life-cycle costs.

### NO UNWANTED AUDIBLE ALARMS

Now with both 4mm and 10mm Parking Snap

The dictionary defines constant as uniform and unchanging, and continuous as uninterrupted. Nonetheless, some dual-wire resistance monitors utilize a pulsed test current and do not really provide continuous monitoring. For example, during each 2.2 second pulse cycle of a leading "constant" resistive monitor, electrical current is pulsed for only 0.2 seconds followed by an unmonitored interval of 2 seconds. This leaves the user/wrist strap unmonitored for over 90% of each cycle. Damaging static charges can easily occur in the portion of the time in between the pulses. The off period of 2 seconds equals 2 billion nanoseconds, and "it takes only about 25 volts applied for 100 nanoseconds to blow most memories or microprocessors".\* The dual-wire system does not reliably meet all industry specifications, as the cords do not meet the EOS/ESD S-1.0 paragraph 4.1.6, .38 kilogram - 1.86 kilogram "breakaway force" requirement for operator safety.

By using the reliable wave distortion technology to determine if the circuit is complete, there are no false alarms. There is no need to adjust or tune the monitor to a specific user or installation. The miniscule amount of electrical current (less than 1 volt coil cord signal) required to generate the waveform has never caused reported skin irritation and is extremely safe for use in voltage sensitive applications such as disk drive manufacturing.

## Installation

Confirm that the Surface Resistance (RTG) of the mat is  $5 \times 10^8$  Ohms or less and has a conductive layer. Remove the monitor from its packaging and inspect for any shipping damage. Included with each Jewel<sup>®</sup> Workstation Continuous Mini Monitor should be:

- 1 220 VAC transformer
- 2 Push and clinch snaps (80008)
- 1 10mm Adapter (80020)

The Continuous Mini Monitor is normally installed toward the front edge of a workstation where the LEDs are easily visible. The unit is designed to be mounted using the 10mm studs mounted at the bottom of the monitor. See figure 2.

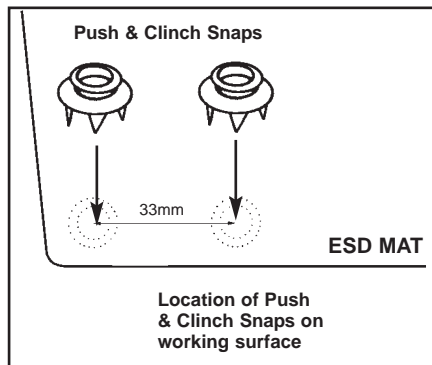


Figure 2. Installation of Push and clinch snaps.

Figure 3 illustrates how the monitor is snapped to the working surface.

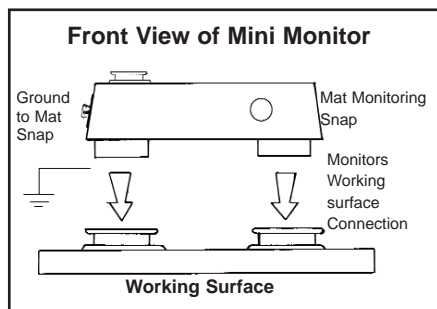


Figure 3. Attaching monitor to working surface

It is also possible to permanently mount the Mini Monitor to the Working Surface using the threaded inserts on the bottom of the unit.

Figure 4 shows the wiring connection for the Jewel<sup>®</sup> Workstation Continuous Mini Monitor.

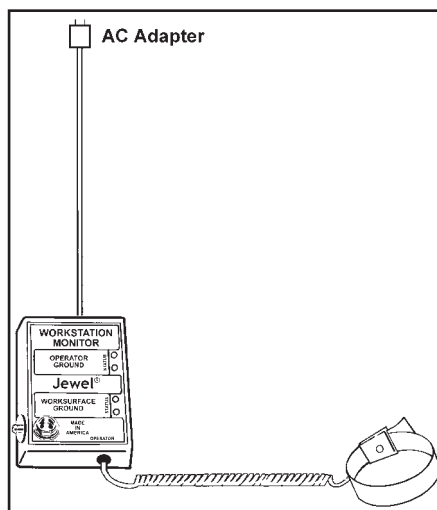


Figure 4. Operating the Jewel<sup>®</sup> Workstation Continuous Mini Monitor.

The following procedure will outline how to correctly wire the Jewel<sup>®</sup> Workstation Continuous Mini Monitor so as to properly monitor an ESD protected workstation.

1. Confirm that the working surface surface resistance is  $5 \times 10^8$  Ohms or less.
2. A convenient 220 VAC outlet should be located and tested for proper wiring and grounding.

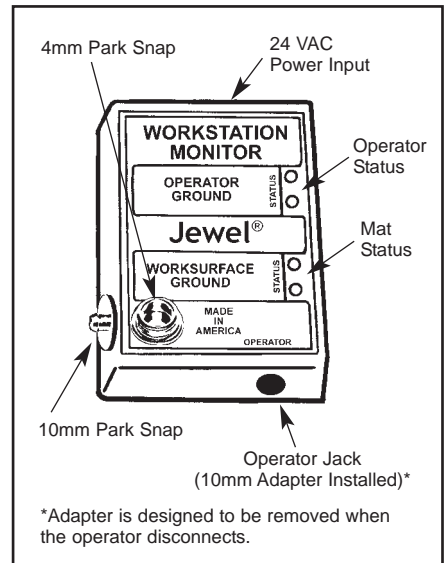


Figure 5. Operating the Jewel<sup>®</sup> Workstation Continuous Mini Monitor.

3. Plug the transformer into the outlet and connect the mini plug into the back side of the monitor. The green Working Surface LED should be lit. The monitor is now ready for use. If the red Working Surface LED is flashing, check the snap fasteners for proper connection.

## Installation on Micastat<sup>®</sup> Laminate

Materials Needed:

- 2 90202 Flush Mount Laminate Ground Inserts
- 1 90200 Installation Tool for Flush Mount Insert
- 1 10mm Socket and Rivet (100 per pack)
- 2 8-32 button cap screws

1. Install the 90202 Flush Mount Inserts in the snap pattern for the monitor.
2. Once installed, remove the 8-32 screw supplied.
3. Place a 10mm snap socket on top of the installed 90202 brass insert.
4. Screw the 10mm snap socket into place on the insert using an 8-32 button cap screw.

\*1981 article by Donald E. Frank - Electrical Overstress / Electronic Discharge Symposium Proceedings

- Do this for both inserts and snap attach the mini monitor into place; it is now grounded to and monitoring the Micastat®.

## Operation

When the Jewel® Workstation Continuous Mini Monitor is installed and is connected to an ESD protective working surface, and it is grounded via an AC adapter cord, the monitor's green Working Surface LED and its red Operator LEDs should be on. The monitor takes 6 seconds to activate its alarm circuitry when it is first plugged in.

- The AC adapter must include the ground reference on the barrel of the output plug.
- The AC adapter therefore supplies the monitor with ground.
- The mat resistance is measured between the two snaps on the bottom of the unit.
- This monitor simplifies the workstation because no other wiring is needed.

### TO USE THE MONITOR:

1. Plug a wrist strap cord, not attached to the wristband, into the monitored jack on the front of the unit. This automatically activates the selected operator channel. The red operator LED should turn on.

2. Snap the cord to the wristband, and slip it on your wrist. (It should fit snugly.) This should silence the audio and cause the LEDs to switch from red to green. If this does not happen, check the coil cord for continuity or damage. Examine your wrist and ensure that it has a secure fit. If you have dry skin use antistatic hand lotion. When leaving the area, a person can take the coil cord along or leave it attached to the monitor in park position. Alarm will shut off in approximately 8 seconds when operator grounding cord is removed from unit or will instantly shut off when cord is parked.

### PARK SNAP

The audible alarm is designed to alert both operator and supervisor. The Park Snap feature provides a means for an operator to disconnect when normally leaving the work area, without the audible alarm sounding, and it provides a means of wrist cord storage (visual red LED will illuminate). By the operator touching the Park Snap, the audible alarm is disabled for about 8-10 seconds. The operator can remove the wrist strap cord and attach socket and cord to Park Snap for storage. If

the cord is plugged into the jack marked "Operator" the monitor will alarm continuously until you either park the cord, or remove the cord from the operator jack. In the case of removing the cord from the jack, the audio alarm will only sound for about eight seconds. The mini monitor is provided with both a 4mm and 10mm parking snap.

### WORKING SURFACE CHANNEL

The Jewel® Workstation Continuous Mini Monitor monitoring circuitry is sufficiently sensitive to detect extremely low current, allowing it to be used with mats having a resistance of up to 5 x 10E8 Ohms RTG.

Working surface must have a conductive layer such as Dual Layer Rubber or Dissipative 3 Layer Vinyl or Micastat® Dissipative Laminate with conductive buried layers. Charleswater Continuous Monitors are not recommended for use with homogeneous matting.

When the monitor is connected to an ESD Mat working surface, the amount of current that flows is a function of the total resistance between the monitor and through the working surface to ground. When the resistance of the working surface is below a pre-set threshold, the monitor will indicate good. Conversely, if the resistance level is high when compared to the monitor's reference, the unit will alarm. This is an integrating resistance measuring circuit, therefore it is relatively insensitive to externally induced electromagnetic fields. The resistance threshold is factory set to 500 megohms. (It can be special ordered to other limits. Limits can be varied and set to 1 gigohm maximum.)

## Specifications:

Test range of monitored circuit  
500K - 10M ohm†

Working Surface Limit\*  
Set to 500 Megohms ± 20%

Operating Voltage  
220VAC, 50-60 Hz

Wrist strap open circuit voltage  
1.2 volts peak to peak @  
1-2 MicroAmps

Mat test open circuit voltage  
5 to 7.5 volts

Response time to alarm  
<50mS

Operating Temperature  
0 - 40°C

Humidity Range:  
0-95% RH, non-condensing

## Size

70mmL x 53mm W x 18mm H

† This cannot be verified with standard DC test equipment. The continuous monitor is an impedance sensing device and the limits are determined by the magnitude and angle of the impedance.

\* Contact factory for special limits.

**Note:** Work surface must have a conductive layer such as Dual Layer Rubber or Dissipative 3-Layer Vinyl or Micastat® Dissipative Laminate with conductive buried layers. Charleswater Continuous Monitors are not recommended for use with homogeneous matting.

## Maintenance and Calibration

The Jewel® Workstation Continuous Mini Monitor is solid state and designed to be maintenance free. It is calibrated to factory specifications. There are no user adjustments necessary. Because of the wave distortion sensing nature of the test circuit, special equipment is required for calibration. We recommend that calibration be performed annually by the Charleswater factory. Please call our Crowborough facility at 00 44 (0) 1892-665313 or fax 00 44 (0) 1892-668838 for information on calibration.

### Limited Warranty

Charleswater expressly warrants that for a period of one (1) year from the date of purchase Charleswater Continuous Monitors will be free of defects in material (parts) and workmanship (labour). Within the warranty period, a credit for purchase of replacement Charleswater Continuous Monitors, or, at our option, the Continuous Monitor will be repaired or replaced free of charge. If product credit is issued, the amount will be calculated by multiplying the unused portion of the expected one year life times the original unit purchase price. Call Customer Service at 00 44 (0) 1892-665313 for a Return Material Authorisation (RMA) and proper shipping instructions and address. Include a copy of your original packing slip, invoice, or other proof of date of purchase. Any unit under warranty should be shipped prepaid to the Charleswater factory. Warranty repairs will take approximately two weeks.

If your unit is out of warranty, Charleswater will quote repair charges necessary to bring your unit up to factory standards. Call Customer Service at 00 44 (0) 1892-665313 for a Return Material Authorisation (RMA) and proper shipping instructions and address. Ship your unit prepaid to the Charleswater factory.

### Warranty Exclusions

THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean or repair products.

### Limit of Liability

In no event will Charleswater or any seller be responsible or liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, users shall determine the suitability of the product for their intended use, and users assume all risk and liability whatsoever in connection therewith.