Jewel® Workstation Continuous Mini Monitor Installation, Operation and Maintenance

Made in the United States of America

Figure 1. Charleswater 99135 Jewel® Workstation Continuous Mini Monitor.

Description

The Jewel® Workstation Continuous Mini Monitor independently monitors the operator and the worksurface. 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 a path to ground of less than 500 megohms exists from the ESD worksurface.

The Jewel® Workstation Continuous Monitor is a Single Conductor Impedance Sensing Continuous Monitor which per ESD Handbook TR20.20 section 5.3.9.2.1 "a small AC voltage is used in a detection circuit designed to eliminate false alarms and adjustment. They use the phase difference between current and voltage to detect changes in impedance of the grounding cord, wristband and person. No adjustments are required."

Per CLC/TR 61340-5-2:2008 User guide Wrist Strap Test Frequency sublcause 4.7.2.4.4, "Typical test programs recommend that wrist straps that are used daily should be tested daily. However, if the products that are being produced are of such value that knowledge of a continuous, reliable ground is needed, and then continuous monitoring should be considered or even required."

All Charleswater single-wire continuous monitors with wave distortion technology include the Park Snap feature. Use the Park Snap to store the operator's wrist cord and enable standby mode while the operator is away from the workstation. Before disconnecting the coiled cord from the wristband, the operator touches the Park Snap to disable the audio alarm for 6 seconds. Within the 6 second period, the operator can disconnect their wrist cord from their wristband and attach it to the Park Snap before the audible alarm sounds.

Advantages Of Continuous Monitoring Over Periodic Testing

"When considering constant [or continuous] monitors, the equipment cost including the wrist strap, maintenance and training cost, labour time for performing wrist strap tests, and the potential failures due to non-functional wrist straps should be considered. A broken wrist strap may expose products to ESD over an entire shift if it is checked only at shift change with wrist strap checker." (ESD TR 12-01 Section 4.2 Selection Considerations)

The Jewel® Workstation Continuous Monitor eliminates the need for periodic wrist strap tests and logging. 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 way have been manufactured. The costs of dealing with the resulting catastrophic or latent defects can be considerable. Jewel® Workstation Continuous Mini Monitors eliminate the need for operaters to test wrist straps and log the results; by their function, these monitors satisfy the ISO 9000 and ANSI/ESD S20.20 test logging. ANSI/ESD S20.20 Section 6.2.2.2 Personnel Grounding Guidance states "A log should be maintained which verifies that personnel have tested their personal grounding devices." Per ANSI/ESD-S1.1 Annex A Section 6.1.3 "Daily (wrist strap system) testing may be omitted if constant monitoring is used." Per ANSI/ESD-S1.1 Annex A Frequency of Functional Testing, "The wrist strap system should be tested daily to ensure proper electrical value. Daily testing may be omitted if constant monitoring is used."

Park Snap

All Charleswater single-wire monitors with wave distortion technology include the Park Snap feature. Use the Park Snap to store the operator's wrist cord and enable standby mode while the operator is away from the workstation. Before disconnecting the coil cord from the wristband, the operator touches the Park Snap to disable the audio alarm for 6 seconds. Within the 6 second period, the operator can disconnect their wrist cord from their wristband and attach it to the Park Snap before the audible alarm sounds.

Wave Distortion Detection Technology Provides True 100% Continuous Monitoring

Wave distortion impedance 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

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capacitive reactance. By monitoring these "distortions" or phase shifts, the Jewel® Workstation Continuous Mini Monitor will reliably determine if the circuit is complete.

Wave distortion technology can be referred to as "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 41 kilogram person to 1.8 meter 13 centimeter 91 kilogram person), the Jewel® Workstation Continuous Mini Monitor cannot be "fooled". It will provide a reliable alarm only when the wrist strap or work surface becomes dysfunctional or unsafe according to accepted industry standards. The Jewel® 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® 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 less durable dual-wire cords and special wrist straps. The Jewel® Workstation Continuous Mini Monitor is an economical way to monitor both the operator's wrist strap and workstation surface. See "Maintenance and Calibration" (page 4) to minimize life-cycle costs.

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 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".*

By using the reliable wave distortion impedance 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.

Worksurface 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 10^8 ohms RTG. When the Monitor is connected to an ESD Mat worksurface, the amount of current that flows is a function of the total resistance between the monitor and through the worksurface to ground. When the resistance of the worksurface 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.)

Packaging

1 Jewel® Workstation Continuous Mini Monitor
2 Push and Clinch Snaps
1 Power Adaptor, 24 VAC
1 Banana Plug / 10mm Snap Adapter
1 Certificate of Calibration

Cords must be ordered separately.

Installation

Confirm that the surface resistance (Rtg) of the mat is 5 x 10^8 ohms or less and has a conductive layer. We recommend the Charleswater 99026 or 99111 Meter. Remove the monitor from its packaging and inspect for any shipping damage.

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 snapped on the worksurface using the 10mm snap studs mounted at the bottom of the monitor (see Figure 2).

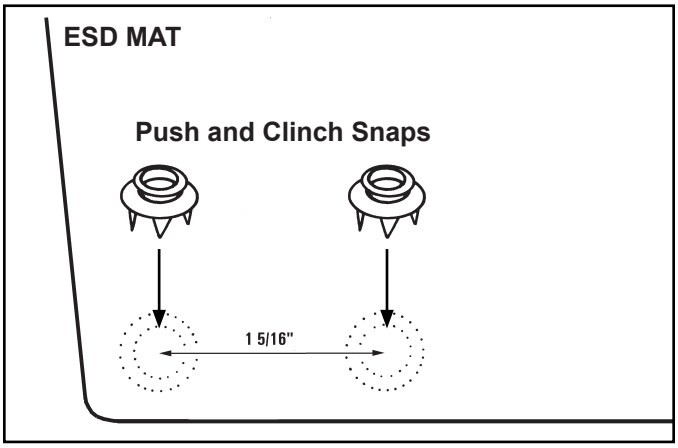

Figure 2. Installation of push and clinch snaps to worksurface.

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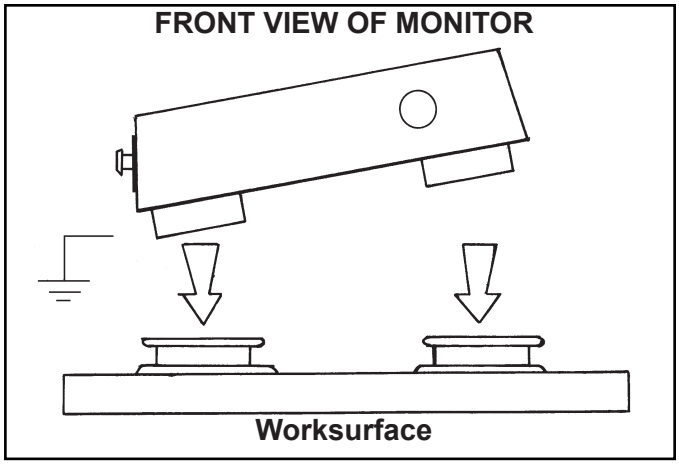

Figure 3. Installation of the monitor to the worksurface one snap at a time.

NOTE: Install the monitor to the worksurface by aligning one snap at a time and applying a downward force directly above that snap.

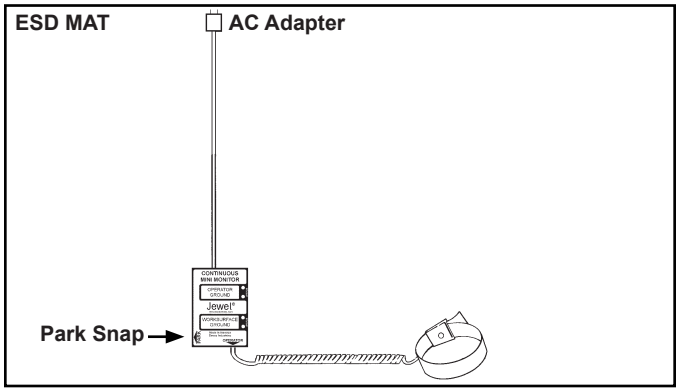

Figure 4. Operating the Jewel® Workstation Continuous Mini Monitor.

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

1. Confirm that the worksurface surface resistance is 5 x 10^8 ohms or less and has a conductive layer.
2. A convenient outlet should be located and tested for proper wiring and grounding. We recommend the Charleswater 99142 AC Outlet Analyzer to verify proper wiring and ground.
3. Plug the AC Adapter into the outlet and connect the mini plug into the back side of the Monitor. The green Worksurface LED should be lit. The Monitor is now ready for use. If the red Worksurface LED is flashing, check the snap fasteners for proper connection.

Operation

When the Jewel® Workstation Continuous Mini Monitor is installed and is connected to an ESD protective work surface, and it is grounded via an AC adapter cord, the monitor's green Worksurface 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 custom AC adapter connects the ground outlet to the barrel on 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, eliminating the need for a separate mat ground cord.

TO USE THE MONITOR

1. Plug a wrist strap cord banana plug into the monitored banana jack on the front of the unit. The included banana plug / 10mm adapter may be inserted into this jack if a wrist cord with a 10mm snap is to be used with the monitor. This automatically activates the operator channel. The red operator LED should illuminate.

NOTE: The monitor is not compatible with wrist cords that have 1 megohm resistors at both terminations. The termination with the 1 megohm resistor must always be connected to the operator and not the monitor.

2. Remove the charges from your body by making contact with a properly grounded ESD worksurface. Snap the cord to the wristband, and fit it snugly onto the wrist. 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 the wrist and secure that it has a secure fit. If you have dry skin, apply an approved dissipative hand lotion such as Menda 70950 Reztore™ ESD Hand Lotion. Use the Park Snap to store the operator's wrist cord and enable standby mode while the operator is away from the workstation. Before disconnecting the coil cord from the wristband, the operator touches the Park Snap to disable the audio alarm for 6 seconds. Within the 6 second period, the operator can disconnect their wrist cord from their wristband and attach it to the Park Snap before the audible alarm sounds.

NOTE: Removing the banana plug from the monitor's operator jack will disable the audio alarm.

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It is recommended that you use the Park Snap rather than continuously removing the Banana Plug from its jack. Doing so will increase the life span of the operator jack. If your process requires the constant insertion and removal of the banana plug, please contact your Charleswater Representative for alternate solutions.

Specifications:

Test range of monitored circuit:
500K - 10M ohms†

Worksurface Limit*:
Set to 500 Megohms ± 20%

Operating Voltage:
24VAC, 50-60 Hz

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

Mat test open circuit voltage:
5 - 7.5 Volts

Response time to alarm:
<50 mS

Operating Temperature:
0ºC - 38ºC

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

Dimensions:
70.4mm L x 52.6mm 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: Worksurface 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 NIST traceable standards. There are no user adjustments necessary. Because of the wave distortion impedance sensing nature of the test circuit, special equipment is required for calibration. We recommend that calibration be performed annually using the Charleswater 50512 Continuous Monitor Calibration Unit. The Calibration Unit is a most important product which allows the customer to perform NIST traceable calibration on continuous monitors. The 50512 is designed to be used on the shop floor at the workstation, virtually eliminating downtime, verifying that the continuous monitor is operating within tolerances. The 50512 provides a simple and quick means to assure compliance verificaton Per ANSI/ESD S20.20 Table 3 per ESD TR53.

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 (labor). Within the warranty period, the product will be tested, repaired or replaced at Charleswater's option, free of charge. Call Customer Service at 00 44 (0) 1892-665313 for a Return Material Authorisation (RMA) and for proper shipping instructions and address. You should include a copy of your original packing slip, invoice, or other proof of purchase date. Any unit under warranty should be shipped prepaid to the Charleswater factory. Warranty replacements will take approximately two weeks.

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 inury, 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.

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