

Dual Operator Workstation Continuous Monitor Operation, Installation and Maintenance

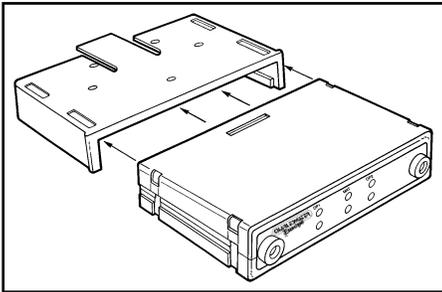


Figure 1. Charleswater Europe 99071 Dual Operator Workstation Continuous Monitor.

Description

The Charleswater Europe Dual Operator Workstation Continuous Monitor continuously monitors the grounding integrity of two operators, and an ESD protective work surface's discharge path to ground. The monitor will provide instantaneous notification of static control equipment failures, eliminating the need of 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.

The Dual Operator Workstation Continuous Monitor is an impedance sensing device designed to monitor body types from a 5th percentile female to a 95th percentile male. This range covers a 1.5 meter tall 40.8 kilogram person to a 1.9 meter 113.8 kilogram person in any production environment.* The 99071 is powered by a 220 VAC, 60/50 Hz, plug-in transformer.

No user adjustment required: The Continuous Monitor is drift-free and designed to be insensitive to the effects of squeezing or stretching the coil cord. It requires no user adjustment or calibration.

The Dual Operator Workstation Continuous 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 work

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 work surface. No user adjustment or calibration required. The solder connection of the resistor in inexpensive coil cords often exhibits intermittent failures that are often not detected using touch testers.

ADVANTAGES OF WORKSTATION CONTINUOUS MONITORING OVER PERIODIC TESTING

Many customers are eliminating periodic testing and are utilizing workstation continuous monitoring to better ensure that their products were manufactured in an ESD controlled environment. Full time workstation continuous monitoring is superior to pulsed monitoring as well as periodic testing, and can save a significant amount of money in testing costs and rejected product. Periodic testing detects failures after ESD sensitive products have been manufactured. The costs of dealing with the resulting catastrophic or latent defects can be considerable. Dual Operator Workstation Continuous Monitors eliminate the need for users to test wrist straps and log the results; by their function, these monitors satisfy the ISO 9000 test logging requirement.

WAVE DISTORTION DETECTION TECHNOLOGY PROVIDES TRUE 100% CONTINUOUS MONITORING

From all the technical alternatives available, Charleswater Europe has chosen wave distortion technology for all 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 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 electromagnetic 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 a 1.9 meter 113.8 kilogram person), the Dual Operator Workstation Continuous 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 Dual Operator Workstation Continuous 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 Charleswater Europe Dual Operator Workstation Continuous 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 & 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,

**NASA Publication 1024- Anthropomorphic Source Book Volume 1: "Anthropometry for Designers"*

this can make the dual-wire system three to five times as expensive as a system utilizing single-wire wrist straps and cords.

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 Association guidelines for the 1 to 5 pound "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 worksurface is 5×10^8 ohms or less. Remove the monitor from its packaging and inspect for any shipping damage. Included with each Dual Operator Workstation Continuous Monitor should be:

- 1 220 VAC transformer
- 1 Work surface ground cord
- 1 Push and clinch snap (80008)
- 2 Remote Jacks
- 2 Mounting screws

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

The Model 99071 is normally installed under the bench top toward the front edge of a workstation where the LEDs are easily visible. The unit is designed to be mounted using the mounting bracket provided. See figure 2. To release monitor, push up on the monitor release tab.

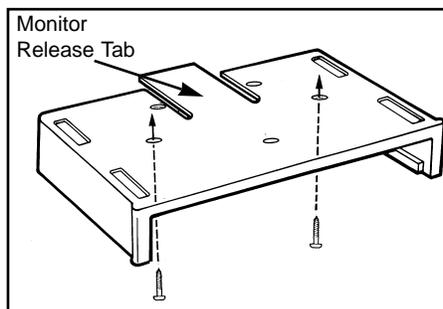


Figure 2. Installation of mounting bracket.

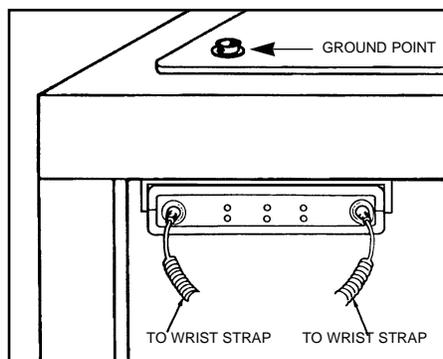


Figure 3. Operating the 99071 monitor.

Figure 3 shows the monitor as it is viewed from the front. Figure 4 shows the monitor as it is viewed from the rear, with the work surface wiring in place.

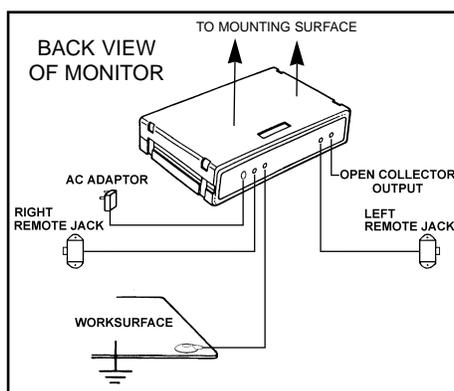


Figure 4. Wiring connection instructions for the 99071.

The following procedure will outline how to correctly wire the 99071 so as to properly monitor an ESD protected workstation.

1. Use rear access connections when using monitor with remote jacks. Access holes are provided on the bottom of the unit to loosen/tighten connections. See Figure 4 for wiring connection instructions.

2. Verify that a ground cord is properly connected to snap socket on one corner of the ESD work surface. The other end of the ground cord must be attached to a known good ground point.

3. **Confirm that worksurface surface resistance is 5×10^8 ohms or less.** Connect the stripped end of the work surface cord included with the unit to the terminal marked "Work Surface" on the back of the unit. Snap the other end to the worksurface as shown in figures 4 and 5.

4. A convenient 220/240 VAC outlet should be located and tested for proper wiring and grounding.

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

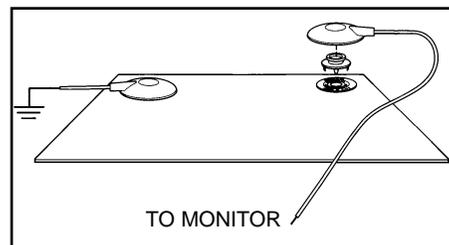


Figure 5. Installing cords on the worksurface.

Operation

When the 99071 monitor is installed and is connected to a grounded ESD protective work surface, the monitor's green Work Surface LED and its two red Operator LEDs should be on.

TO USE THE MONITOR:

1. Plug a coil cord into either of the monitored jacks on the front of the unit. This automatically activates the selected operator channel. The red Operator LED should turn on and the audio alarm should beep.

2. Snap the coil cord to the wrist strap, and slip it on your 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 your wrist and ensure that it has a secure fit. If you have dry skin use anti-static hand lotion.

When leaving the workstation, a person can take the coil cord along or leave it at the workstation. In either case the audio alarm will only sound for about eight seconds.

Whenever the coil cord is accidentally withdrawn from the monitor, or if continuity from the user to the monitor is not maintained, the alarm sounds, the green Operator LED turns off and the red Operator LED turns on.

COMPUTER INTERFACE

The model 99071 monitor also incorporates logic output circuitry. The unit is designed with an open collector circuit that can be set up to activate remote sirens, alarms or interface with a computer. The open collector circuit is accessible through the terminal screw on back of the monitor. See figure 4 for location.

WORK SURFACE CHANNEL

The 99071's Work Surface 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 10⁸ ohms.**

When the monitor is connected to a static dissipative work surface, the amount of current that flows is a function of the total resistance between the monitor and through the work surface to ground. When the resistance of the work surface is below a preset threshold, the monitor will indicate good. Conversely, if the resistance level is high when compared to the monitor's reference, the alarm will sound. 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. Custom worksurface range available upon request. Call for details.

Specifications

Work Surface Limit*
Set to 500 Megohms

Operating Voltage
220 VAC, 50-60 Hz

Response time to alarm
< 50 mS

Operating Temperature
0 - 40°C

Long Term Drift
<0.5% per Decade
(1st Decade is 1 hr)

Size (less bracket)
82.5mm x 120.6mm x 27.9mm

OPEN COLLECTOR OUTPUT

Fail-Safe: For fail safe operation, an active low is required. If the monitor detects an operator-grounding fault, the open collector port goes low (with respect to the green wire ground).

One-Wire: Since the monitor detects that there is a low resistance between the green wire ground and the neutral conductor in the branch circuit, less than 1K ohms, the green wire ground serves as the reference or the second wire between the monitor and its remote warning device. The open collector port is the other.

Specifications:

V (open circuit)	>20 V
I (short circuit)	200 uA
Pull-up to 15V	>50 uA (Active)
Pull-up to 5V	>150 uA (Active)
Pull-down to 0.5V	>400 uA (Active)
Third-state HiZ	>100 K ohms (unit unplugged)

Maintenance and Calibration

The Dual Operator Workstation Continuous Monitor is solid state and designed to be maintenance free. The 99071 is calibrated to factory specifications. There are no user adjustments that can be made. Because of the impedance sensing nature of the test circuit, special equipment is required for calibration. We recommend that any units requiring calibration be returned to the factory. Please call or fax our Crowborough factory for information on calibration.

*Limits can be varied and set to 1 gigohm maximum.

Limited Warranty

Charleswater Europe expressly warrants that for a period of one (1) year from the date of purchase, Charleswater Europe 99071 Workstation Monitors will be free of defects in material (parts) and workmanship (labour). Within the warranty period, a unit will be tested, repaired or replaced at Charleswater Europe's option, free of charge. 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 Europe factory. Warranty repairs will take approximately two weeks.

If your unit is out of warranty, Charleswater Europe 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 Europe 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 Europe 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.