

# Dual Operator Continuous Monitor Installation, Operation and Maintenance



Made in the  
United States of America



Figure 1. Desco Dual Operator Continuous Monitor

## Description

The Desco Dual Operator Continuous Monitor is a workstation continuous monitor. It continuously monitors the path-to-ground integrity of two operators and one ESD worksurface. Mounting tabs make it suitable to install in workbench or equipment settings, and the Visual Status Display can be placed to increase alarm visibility. It may be connected to the 19323 Power Relay accessory to control power to electronic devices at the workbench dependent on the continuous monitor's status.

The Dual Operator Continuous Monitor is designed with Wave Distortion Technology to provide stable continuous monitoring of the path-to-ground and presence of 1 megohm resistance of an operator's wrist strap. Audio and visual alarms activate (in less than 500 milliseconds) when the operator unintentionally disconnects from the monitor, or the wrist strap connection points are intermittent. The Dual Operator Continuous Monitor also monitors for a worksurface path-to-ground of less than 10 megohms and the integrity of the electrical ground used to by the monitor. All Dual Operator Continuous Monitors are calibrated to NIST standards.

## WAVE DISTORTION

**Wave Distortion Technology is the Most Reliable Technology for the Continuous Monitoring of Single-Wire (Conductor) Wrist Straps**

"Wave Distortion" or vector impedance works by applying a continuous test voltage of 1.2 volts peak-to-peak at 1 to 2 microamperes (0.000002 amperes) to the wrist strap that is connected to the continuous or constant monitor. The test voltage creates a square wave that the monitor circuit compares to established patterns. By monitoring the "distortions", or shape of the square wave, Wave Distortion Technology determines if the monitored circuit is complete - the operator is in the circuit and the total equivalent DC resistance is within specifications. Wave Distortion Technology produces a very fast alarm time and minimal false alarms.

ANSI/ESD S20.20 section 7.3 states "Compliance verification records shall be established and maintained to provide evidence of conformity to the technical requirements." Per ANSI/ESD S1.1 Annex A.3 Daily (wrist strap system) testing may be omitted if constant monitoring used." Per ESD Handbook ESD TR 20.20 section 5.3.2.4.4 "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."

The Dual Operator Continuous Monitor and its accessories are available as the following item numbers:

Item	Description
<a href="#">19655</a>	Dual Operator Continuous Monitor, with North American Power Adapter
<a href="#">19656</a>	Dual Operator Continuous Monitor, with Universal Power Adapter
<a href="#">19333</a>	Power Relay, North America
<a href="#">98221</a>	Wave Distortion Monitor Verification Tester
<a href="#">19657</a>	Power Adapter, 100-240 VAC Input, 9 VDC 150 mA Output, North America Plug
<a href="#">19658</a>	Power Adapter, 100-240 VAC Input, 9 VDC 3 A Output, IEC C14 Inlet
<a href="#">50545</a>	Power Cord, Europe
<a href="#">50546</a>	Power Cord, UK

## Packaging

### 19655 Dual Operator Continuous Monitor

- 1 Dual Operator Continuous Monitor
- 1 Visual Status Display
- 1 Modular Cable, 7' Length
- 1 Mat Monitor Cord (White)
- 1 Countersunk Washer
- 1 Flat Head Screw, 6-32 x 1/4"
- 4 Pan-Head Screw, #6 x 3/8"
- 2 Dual Lock Fastener Set, 2" Length
- 1 Power Adapter with North American Plug, 9 VDC

### 19656 Dual Operator Continuous Monitor

- 1 Dual Operator Continuous Monitor
- 1 Visual Status Display
- 1 Modular Cable, 7' Length
- 1 Mat Monitor Cord (White)
- 1 Countersunk Washer
- 1 Flat Head Screw, 6-32 x 1/4"
- 4 Pan-Head Screw, #6 x 3/8"
- 2 Dual Lock Fastener Set, 2" Length
- 2 10mm Interchangeable Park Snap
- 2 10mm Operator Jack Adapter
- 1 Power Adapter with IEC C14 Inlet, 9 VDC



Figure 2. Desco 19655 Dual Operator Continuous Monitor packaging contents



Figure 3. Desco 19656 Dual Operator Continuous Monitor packaging contents

# Features and Components

## Dual Operator Continuous Monitor

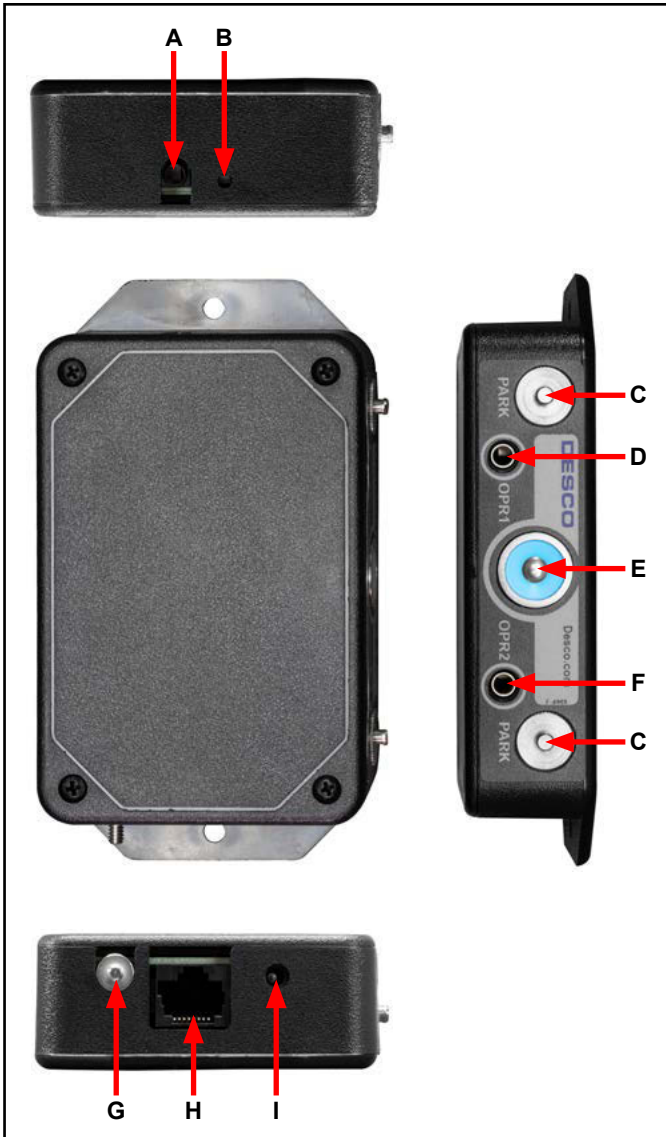


Figure 4. Dual Operator Continuous Monitor features and components

**A. Auxiliary Jack:** Connects to the 19333 Power Relay accessory. See [TB-3093](#) for more information.

**B. Set Switch:** Toggles the monitor's settings for the audible alarm and mat monitor circuit.

Function	Procedure
Audible Alarm Volume	<ol style="list-style-type: none"> <li>1. Push and release the switch to toggle the buzzer's volume.</li> <li>2. The volume will toggle from low, medium, and high settings.</li> </ol>
Enable / Disable Mat Monitor Circuit	<ol style="list-style-type: none"> <li>1. Push and hold the switch until all LEDs illuminate on the Visual Status Display.</li> <li>2. Release the switch.</li> <li>3. An illuminated MAT LED indicates that the mat monitor circuit is enabled. A non-illuminated MAT LED indicates that the mat monitor circuit is disabled.</li> </ol>

**C. Park Snaps:** Allows the operator to disconnect (and park) a wrist strap when leaving the workstation, without creating a false alarm. Touch the park snap or park switch, and the monitor's audible alarm will disable for approximately 8 seconds. Use this time to disconnect the wrist cord from the wristband, and attach it to the park snap or remove the banana plug from the jack. Upon returning to the workstation and disconnecting the wrist cord from the park snap, the operator has approximately 8 seconds to reconnect the wrist cord to a worn wristband before activating the alarm.

**D. Monitored Operator 1 Jack:** Insert the single-wire wrist cord here to monitor the operator's connection to ground.

**E. Park Switch:** Allows the operator to disconnect (and park) a wrist strap when leaving the workstation, without creating a false alarm. Touch the park snap or park switch, and the monitor's audible alarm will disable for approximately 8 seconds. Use this time to disconnect the wrist cord from the wristband, and attach it to the park snap or remove the banana plug from the jack. Upon returning to the workstation and disconnecting the wrist cord from the park snap, the operator has approximately 8 seconds to reconnect the wrist cord to a worn wristband before activating the alarm. The 8 second timer is indicated by the growing intensity of the park switch's blue LED. The blue LED will pulse when the operator jack is vacant to indicate standby mode.

**F. Monitored Operator 2 Jack:** Insert the single-wire wrist cord here to monitor the operator's connection to ground.

**G. Monitor Mat Terminal:** Verifies that the worksurface's path-to-ground is less than 10 megohms. Connect the white mat monitor cord here.

**H. Display Jack:** Use the included modular cable to connect the Visual Status Display to this connector. The monitor will alarm should the modular cable disconnect from this connector.

**I. Power Jack:** Connect the included 9 VDC power adapter here.

## Visual Status Display

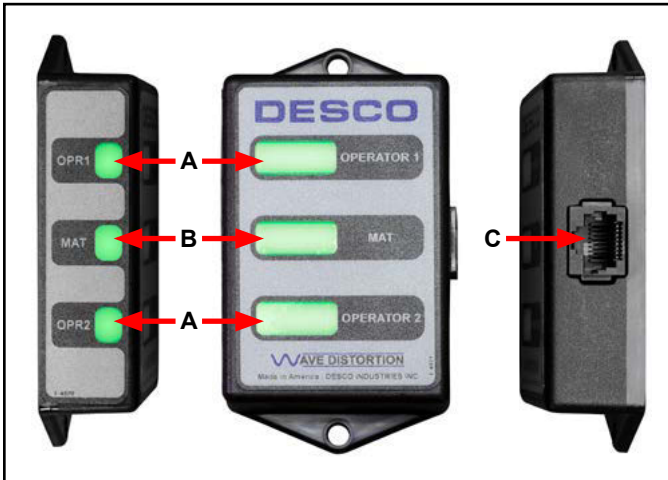


Figure 5. Visual Status Display features and components

**A. Operator LEDs:** Illuminates green when the operator is properly grounded. Illuminates solid red and audible alarm sounds when the operator is not properly grounded.

**B. Mat LEDs:** Illuminates green when the worksurface is properly grounded. Illuminates red and audible alarm sounds when the worksurface is not properly grounded.

**C. Display Jack:** Use the included modular cable to connect the Dual Operator Continuous Monitor to this connector. The monitor will alarm should the modular cable disconnect from this connector.

## Installation

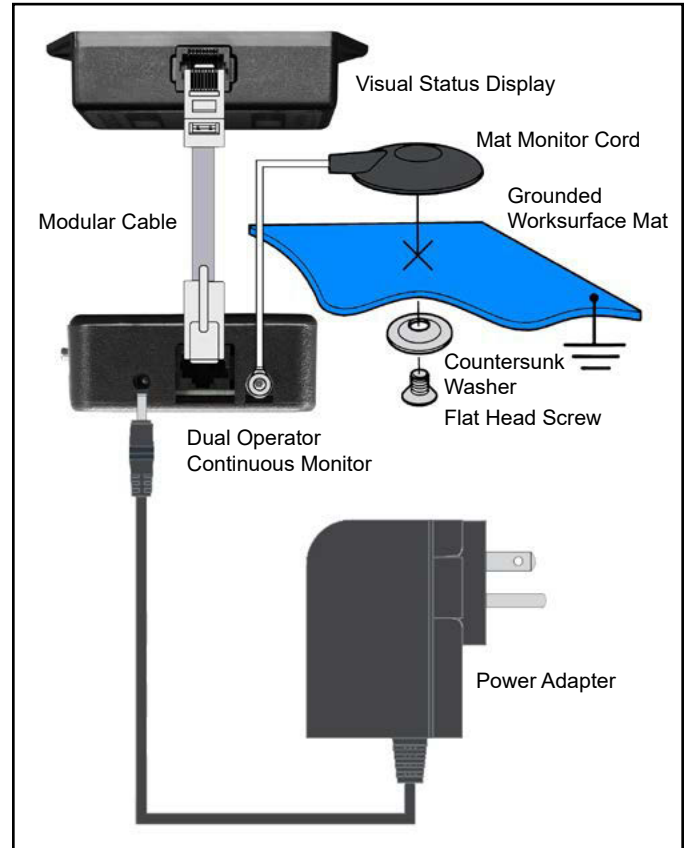


Figure 6. Installing the Dual Operator Continuous Monitor

1. Remove the Dual Operator Continuous Monitor from the carton, and inspect for damage.
2. Locate an appropriate AC outlet near the Dual Operator Continuous Monitor, and test it for proper wiring and grounding prior to use. The Desco AC Outlet Analyzer or similar test equipment may be used to verify the outlet's functionality. Use item [98132](#) for 120 VAC North American outlets and item [98131](#) for 220 VAC UK outlets.
3. Determine the mounting location of the Dual Operator Continuous Monitor. Its operator jacks should be accessible to its operators. Use its mounting tabs and included pan head screws or dual lock fasteners to secure it underneath a table top.
4. Determine the mounting location of the Visual Status Display. Locate it within reach of the included modular cable. Its LEDs should be visible to its operators. Secure the Visual Status Display to a surface using its mounting tabs and included pan head screws or dual lock fasteners.
5. Connect the Visual Status Display to the Dual Operator Continuous Monitor using the modular cable.

6. Secure the ring termination of the white mat monitor cord to the mat monitor screw post on the right-side of the Dual Operator Continuous Monitor.
7. Connect the mat monitor cord from the right-side of the Dual Operator Continuous Monitor to a grounded worksurface mat. Use the included countersunk washer and flat head screw to secure the cord to the grounded mat.
8. Connect the power adapter to the power jack located on the side of the Dual Operator Continuous Monitor, and plug the power adapter into the tested AC outlet.

### 10 mm Snap Adapters

The 19656 Dual Operator Continuous Monitor includes interchangeable 10 mm park snaps and 10 mm banana jack adapters for operators who use wrist cords with 10 mm terminations. Use the park snap's knurled rim to unscrew the 4 mm park snaps from the monitor and install the 10 mm park snaps to the monitor. Plug the 10 mm operator jack adapters into the monitor's operator jacks.



Figure 7. Installing the 10 mm snap adapters to the 19656 Dual Operator Continuous Monitor

### 19333 Power Relay

Pair the 19655 Dual Operator Continuous Monitor with the 19333 Power Relay to control power to workbenches, hand tools, and other electronic devices dependent on the monitor's status.

See [TB-3093](#) for more information.



Figure 8. Desco 19333 Power Relay

### Operation

1. Fit the wristband snugly onto the wrist.
2. Snap the wrist cord to the wristband.
3. Plug the wrist cord into one of the operator jacks. Its corresponding operator LED will illuminate green on the Visual Status Display. This indicates that the operator is properly grounded.
4. If this does not happen, examine the wrist cord for continuity or damage and the wristband to ensure that it fits securely. If you have dry skin, apply an approved dissipative hand lotion such as [Menda Reztore® ESD Hand Lotion](#).
5. When leaving the workstation, first touch the monitor's park switch or park snap. The monitor's audible alarm will disable for approximately 8 seconds. Use this time to disconnect the wrist cord from the wristband and attach it to the park snap without sounding a false alarm.
6. Upon returning to the workstation and disconnecting the wrist cord from the park snap, the monitor will provide approximately 8 seconds for the operator to reconnect the wrist cord to a worn wristband before sounding the monitor's alarm.

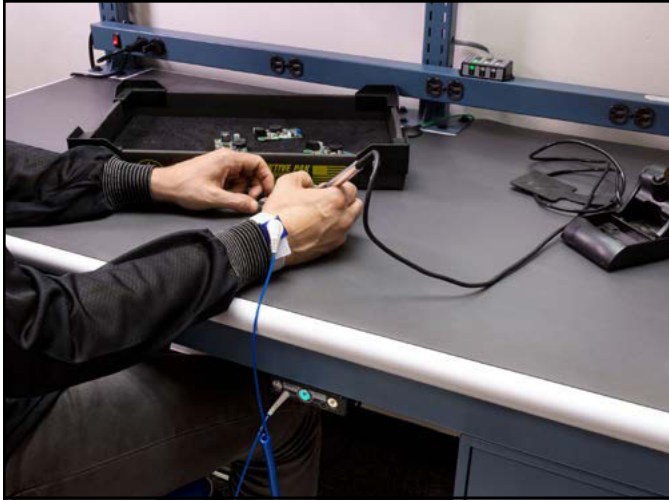


Figure 9. Using the Dual Operator Continuous Monitor at a one-person workstation

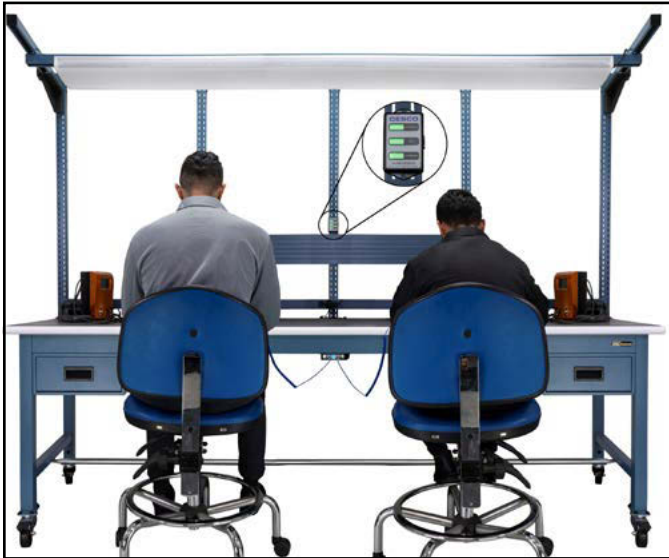


Figure 10. Using the Dual Operator Continuous Monitor at a two-person workstation



Figure 11. Parking two wrist cords onto the Dual Operator Continuous Monitor

## Calibration

Frequency of recalibration should be based on the critical nature of those ESD sensitive items handled and the risk of failure for the ESD protective equipment and materials. In general, Desco recommends that calibration be performed annually.

Use the Desco 98221 Wave Distortion Monitor Verification Tester to perform periodic verification (once every 6-12 months) of the Dual Operator Continuous Monitor. The verification tester can be used to check the test limits of the Dual Operator Continuous Monitor without removing it from the workstation.

See [TB-3074](#) for more information.



Figure 12. Desco 98221 Wave Distortion Monitor Verification Tester

# Specifications

Input Voltage and Frequency (External Adapter)	AC/DC Power Adapter Power Input: 100-240 VAC, 50/60 Hz  Power Output: 9 VDC  Cable Length: 5 ft. (1.5 m)
Operating Temperature	50 to 95° F (10 to 35° C)
Environmental Requirements	Indoor use only at altitudes less than 6500 ft. (2 km)  Maximum relative humidity of 80% up to 85° F (30° C) decreasing linearly to 50% @ 85° F (30° C)
Dimensions (Monitor)	2.85" L x 5.13" W x 1.11" H (72 mm x 130 mm x 28 mm)
Dimensions (Visual Status Display)	3.87" L x 2.08" W x .90" H (98 mm x 53 mm x 23 mm)
Weight (Monitor)	0.30 lbs. (0.14 kg)
Weight (Visual Status Display)	0.11 lbs. (0.05 kg)
Operator Test Range*	500 kilohms to 10 megohms impedance
Worksurface Test Limit**	10 megohms (±20%)
Operator Test Voltage	1.2 V peak-to-peak @ 1.2 µA, open circuit
Worksurface Test Voltage	5 to 7.5 V, open circuit
Alarm Response Time	<500 ms
Country of Origin	United States of America

\*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.

\*\*The worksurface mat must have a conductive layer such as Dual Layer Rubber or Dissipative 3-Layer Vinyl with conductive buried layers. Desco workstation monitors are not recommended for use with homogeneous matting.

ANSI/ESD S20.20 requires the use of a surface resistance meter for periodic verification of a worksurface's resistance-to-ground (Rtg). Constant monitors may not be used as a substitute for this requirement.

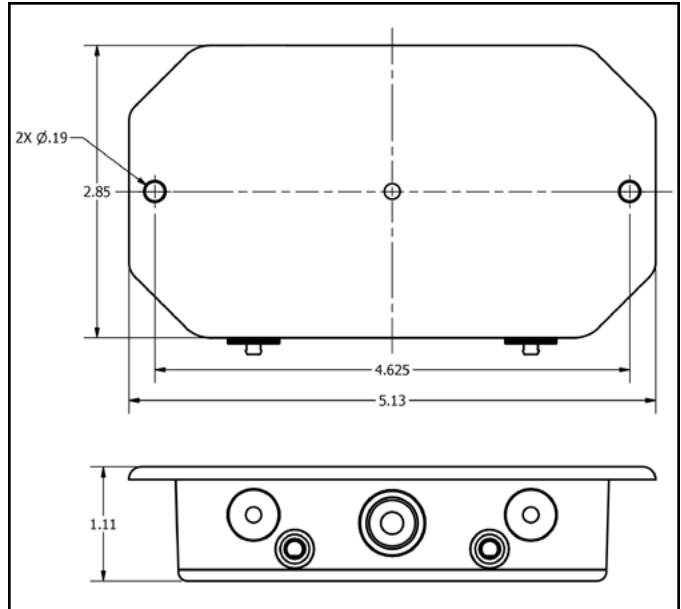


Figure 13. Mounting hole locations on the Dual Operator Continuous Monitor (all dimensions are in inches)

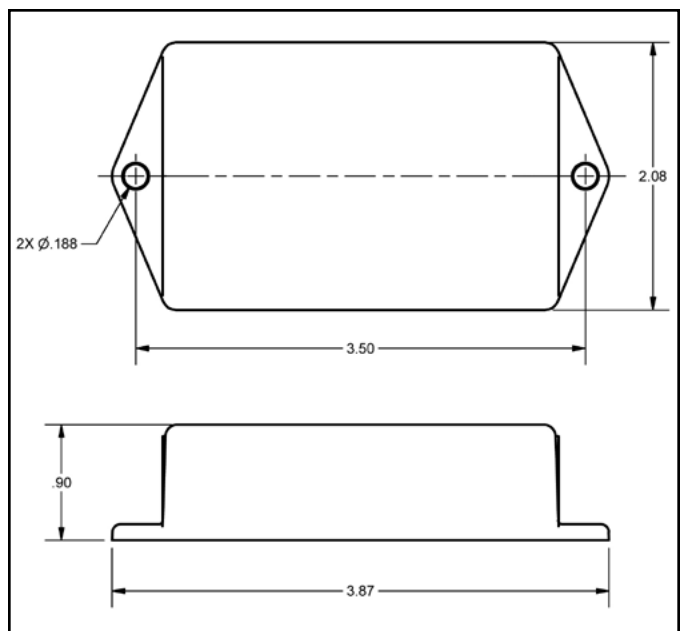


Figure 14. Mounting hole locations on the Visual Status Display (all dimensions are in inches)

**Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions**  
See the Desco Warranty - [Desco.com/Limited-Warranty.aspx](http://Desco.com/Limited-Warranty.aspx)