

# Zero Volt Monitor

## Installation, Operation and Maintenance



Made in the  
United States of America



Figure 1. Desco 19668 Zero Volt Monitor

### Description

The Desco 19668 Zero Volt Monitor is a dual workstation continuous monitor. It continuously monitors the path-to-ground integrity of two operators and two ESD worksurfaces. It also will indicate if voltage greater than  $\pm 1.25$  V is induced onto the operator. Audio and visual alarms activate in failure situations. The Desco Zero Volt Monitor provides stable continuous monitoring of the path-to-ground and presence of two 1 megohm resistors of an operator's dual-wire wrist strap. Audio and visual alarms activate (in less than 500 milliseconds) when the wrist strap connection points are intermittent. The Desco Zero Volt Monitor also monitors for a worksurface path-to-ground less than 3.5 megohms. All Desco Zero Volt Monitors are calibrated to NIST standards and include a certificate. A calibration unit is available to preform compliance verification at the workbench without taking the monitor out of service.

### Desco Zero Volt Monitor Technology

The Desco Zero Volt Monitor uses electrical loop resistance technology. Dual test signals are placed onto each of the dual-wire wrist strap's conductors to negate finger-tip voltage. Resistance is monitored with a continuous split test signal sent through both conductors, across the skin of the operator, and returning to the monitor through the opposite conductor. Desco Zero Volt Monitors determine that the operator's path-to-ground is between the 2 megohms lower limit and 10 megohms upper limit. Additionally, the Desco Zero Volt Monitor determines if voltage greater than  $\pm 1.25$  V has accumulated on the operator.

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 Zero Volt Monitor and its accessories are available in the following item numbers:

Item	Description
<a href="#">19668</a>	Zero Volt Monitor
<a href="#">50524</a>	Limit Comparator
<a href="#">50529</a>	Replacement Operator Remote Kit, Black
<a href="#">50530</a>	Replacement Operator Remote Cable, Black
<a href="#">50531</a>	Replacement Operator Remote Kit, White
<a href="#">50532</a>	Replacement Operator Remote Cable, White
<a href="#">50533</a>	Replacement Operator Remote
<a href="#">50534</a>	Replacement Hardware Kit
<a href="#">19262</a>	Replacement Power Adapter, 12 VDC

### Packaging

- 1 Zero Volt Monitor
- 1 Power Adapter, 12 VDC, with interchangeable plugs (North America, UK/Asia, Europe)
- 2 Operator Remotes
  - 1 Operator Remote Cable, Black
  - 1 Operator Remote Cable, White
- 1 Monitor Ground Cord, Green
- 1 Mat Monitor Cord, Black
- 1 Mat Monitor Cord, White
- 2 Mat Ground Cords, Green
- 1 Hardware Kit
- 1 Certificate of Calibration

## Features and Components

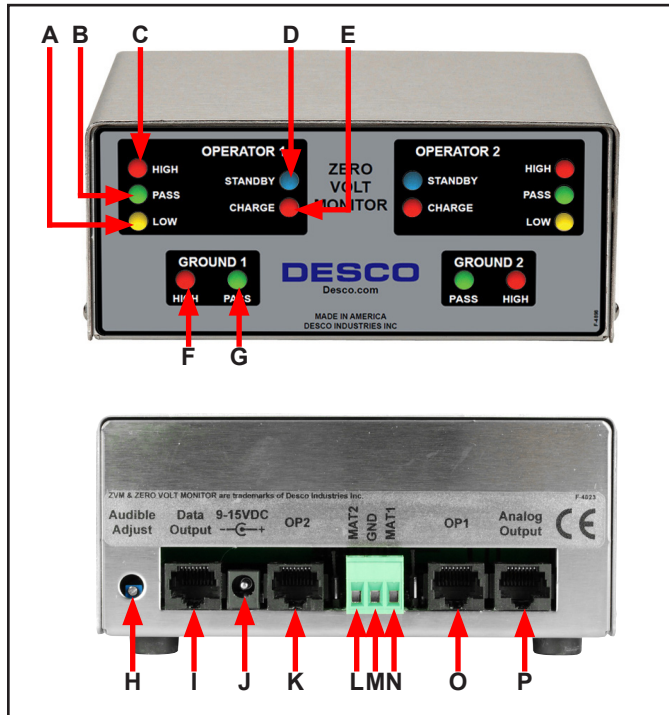


Figure 2. Zero Volt Monitor features and components

**A. Operator Fail Low LED:** Illuminates and audible alarm sounds when the operator's resistance is below the test limit.

**B. Operator Pass LED:** Illuminates when the operator is properly grounded.

**C. Operator Fail High LED:** Illuminates and audible alarm sounds when the operator's resistance is above the test limit.

**D. Operator Standby LED:** Illuminates when the operator is not connected to the operator remote.

**E. Operator Charge LED:** Illuminates and audible alarm sounds when the operator's body voltage is greater than  $\pm 1.25$  VDC.

**F. Mat Fail LED:** Illuminates and audible alarm sounds when the worksurface mat is not properly grounded.

**G. Mat Pass LED:** Illuminates when the worksurface mat is properly grounded.

**H. Alarm Audible Adjustment:** Turn the trimpot clockwise to increase the audible alarm volume. Turn the trimpot counter-clockwise to decrease the audible alarm volume.

**I. Data Output:** For manufacturer use only.

**J. Power Jack:** Connect the included 12 VDC power adapter here.

**K. Operator 2 Remote Jack:** Connect the black operator remote cable here.

**L. Mat 2 Terminal:** Monitors worksurface mat 2. Connect the black mat monitor cord here.

**M. Monitor Ground Terminal:** Common ground point for the monitor. Connect the green monitor ground cord here.

**N. Mat 1 Terminal:** Monitors worksurface mat 1. Connect the white mat monitor cord here.

**O. Operator 1 Remote Jack:** Connect the white operator remote cable here.

**P. Analog Output:** For manufacturer use only.

## Installation

1. Determine the mounting location of the Zero Volt Monitor. The front panel should be visible to both operators.
2. Determine the mounting locations of the operator remotes. Be sure to install the remotes at a distance that enables its leads to reach the back of the monitor.
3. Install tinned wire ends of the mat cords to their appropriate screw terminal block located at the back of the monitor.
4. Attach the worksurface mats to ground using the green mat ground cords. Install the ring terminal end of the cord to an appropriate ground point. Attach the snap terminals to the snaps on the worksurface mats.
5. Install the tinned wire end of the green monitor ground cord to the ground terminal located at the back of the monitor. Install its ring terminal to an appropriate ground point. Be sure to use a different ground point than the one used for the mats. The face plate screw of a grounded AC wall outlet may provide a convenient connection point.
6. Route the mat cords from the back of the monitor to the snaps on worksurface mats. The white cord is for worksurface mat #1. The black cord is for worksurface mat #2.
7. Insert the operator remote cables into their appropriate jacks located at the back of the monitor. The white cable is for operator #1. The black cable is for operator #2.
8. Connect the power adapter to the power jack located at the back of the monitor. Plug the power adapter into a proper AC power outlet. The monitor is now powered.

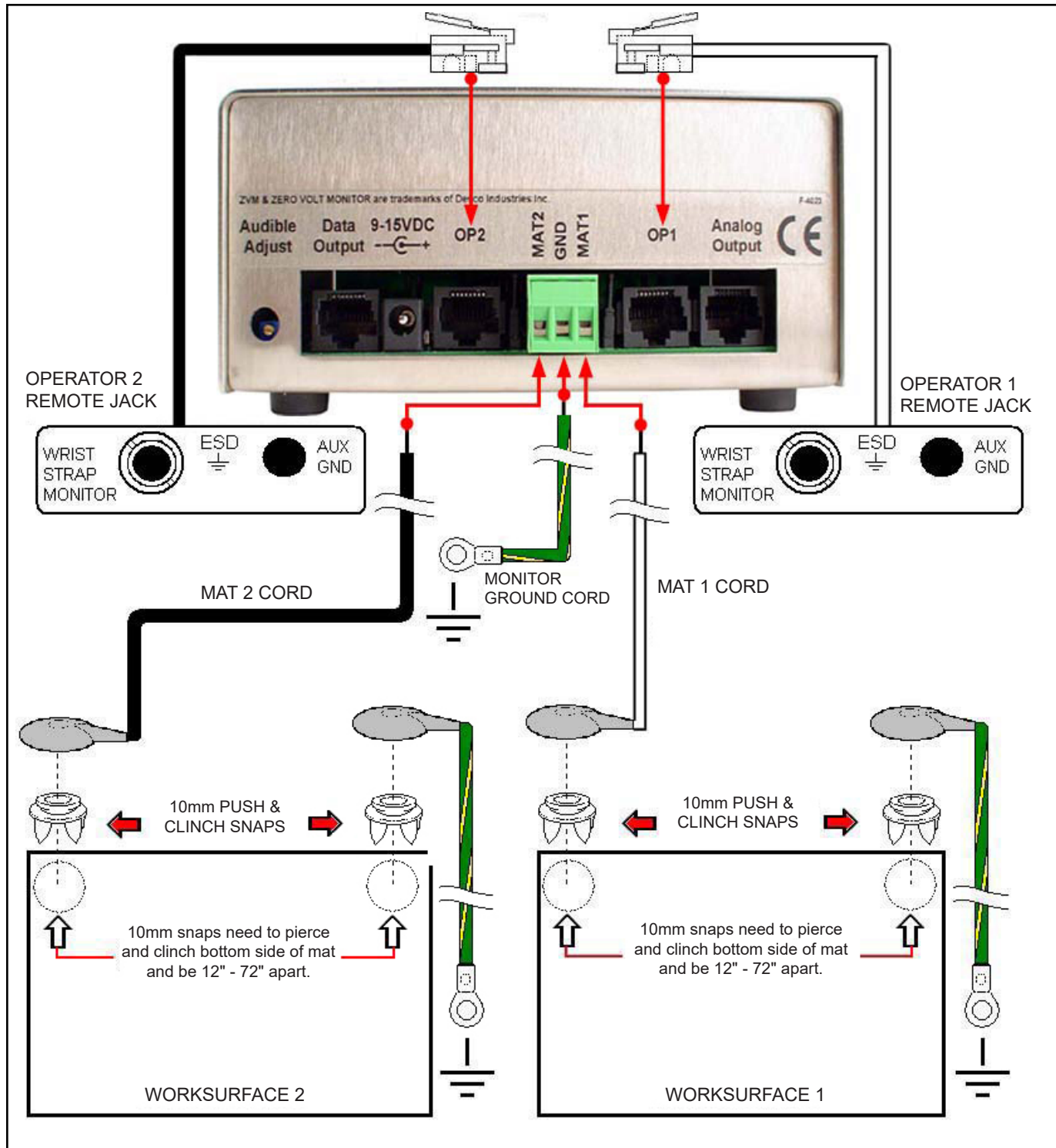


Figure 3. Installing the Zero Volt Monitor

## Operation

1. Fit the wristband snugly onto the wrist.
2. Snap the wrist cord to the wristband.
3. Plug the wrist cord into the dual-wire jack on the operator remote. The green operator LED will illuminate. 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. The AUX MAT jack located on the operator remote is a grounded and unmonitored connection for guests or supervisors. It is intended to be used with a single-wire wrist strap.

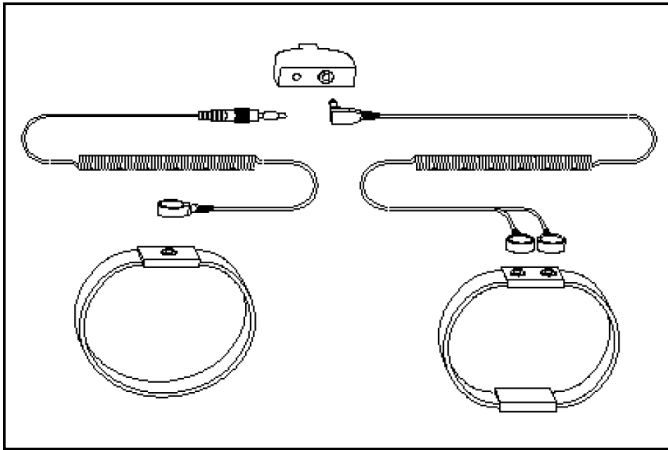


Figure 4. Connecting single-wire and dual-wire wrist straps to the operator remote

## Maintenance

### JUMPER CONFIGURATIONS

Jumper	Jumper Position	Setting
JP5	Off	Audible alarm enabled
JP5	On	Audible alarm disabled
JP6	Off	Charge detection enabled
JP6	On	Charge detection disabled

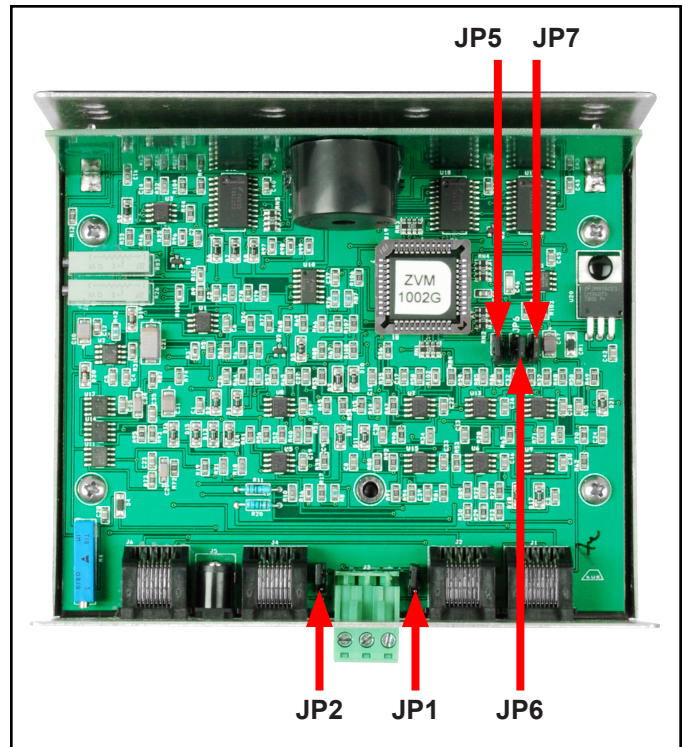


Figure 5. Jumper locations

### WORKSURFACE MAT TEST LIMIT THRESHOLDS

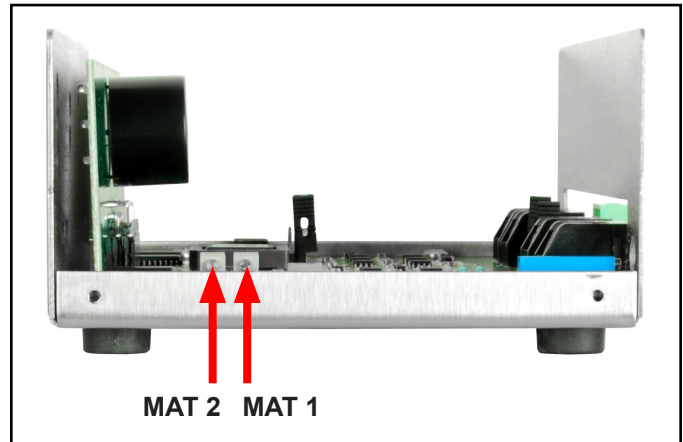


Figure 6. Mat test limit potentiometers



### 3.5 megohms

1. If the desired resistance is 3.5M, jumpers JP1 (MAT 1 and JP2 (MAT 2) need to be on one pin (see Figure 5).
2. The respective potentiometers need to be adjusted fully clockwise. The pots are located inside the unit on the bottom board (see Figure 6).

### High Resistance (10 kilohms to 3.5 megohms)

1. If the desired resistance is 10k - 3.5M, jumpers JP1 (MAT 1) and JP2 (MAT 2) need to be on one pin (see Figure 5).
2. Use a resistor decade box to set the desired resistance between the ground terminal and ground.
3. Connect the mat wire to the decade box and connect the decade box to ground.
4. Turn the appropriate potentiometer counter-clockwise until the GROUND LED illuminates red and alarm sounds (see Figure 6).
5. Slowly turn the potentiometer clockwise until the GROUND LED illuminates green.
6. Add 10% more resistance (at least 1 ohm) to the decade box and verify that the GROUND LED illuminates red and alarm sounds.
7. Return back to the starting resistance and confirm that the green LED illuminates again. Repeat steps 4-7 if the monitor does not fail with the increased resistance or return to a pass condition.

### Low Resistance (<1 kilohm)

1. If the desired resistance is < 1k, jumpers JP1 (MAT 1) and JP2 (MAT 2) need to be on both pins (see Figure 5).
2. Use a resistor decade box to set the desired resistance between the ground terminal and ground.
3. Connect the mat wire to the decade box and connect the decade box to ground.
4. Turn the appropriate potentiometer counter-clockwise until the GROUND LED illuminates red and alarm sounds (see Figure 6).
5. Slowly turn the potentiometer clockwise until the GROUND LED illuminates green.
6. Add 10% more resistance (at least 1 ohm) to the decade box and verify that the GROUND LED illuminates red and alarm sounds.
7. Return back to the starting resistance and confirm that the green LED illuminates again. Repeat steps 4-7 if the monitor does not fail with the increased resistance or return to a pass condition.

## 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 EMIT [50524](#) Limit Comparator to perform periodic verification (once every 6-12 months) of the Zero Volt Monitor Monitor. The verification tester can be used to check the test limits of the Zero Volt Monitor without removing it from the workstation.

See [TB-6542](#) for more information.



Figure 7. EMIT 50524 Limit Comparator

## Specifications

Input Voltage and Frequency (External Adapter)	AC/DC Power Adapter Power Input: 100-240 VAC, 50/60 Hz  Power Output: 12 VDC @ 0.50 A  Cable Length: 6 ft. (1.8 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	5.6" L x 4.7" W x 2.6" H (142 mm x 119 mm x 66 mm)
Weight	1.6 lbs. (0.7 kg)
Operator Test Limts	1.91 megohms to 10 megohms (±10 %)
Worksurface Test Limit*	3.5 megohms (±10 %)
Charge Detect Test Limit	±1.25 VDC
Operator Test Voltage	1.25 V, open circuit
Worksurface Test Voltage	200 mV, open circuit
Country of Origin	United States of America

\*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.

## Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See the Desco Warranty -

[Desco.com/Limited-Warranty.aspx](https://www.desco.com/Limited-Warranty.aspx)

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