Combo Tester X3+
Installation, Operation, and Maintenance

Made in the
United States of America

Figure 1. Desco Combo Tester X3+

Description

The Desco Combo Tester X3+ verifies the functionality of personnel grounding devices (wrist straps[1], foot grounders, ESD shoes, smocks[2]). Three independent tests are performed simultaneously on the wrist strap and each foot. Test prompts and test results with resistance measurements are displayed on the 7 inch color touchscreen display. The administrator menu in the tester's software may be accessed for test limit preferences. Access control to an ESD Protected Area can be further enforced by using the relay terminal on the Combo Tester X3+ and connecting it to an electronic door lock or turnstile to grant access only to those who have passed their personal grounding device tests. The Combo Tester X3+ is calibrated to NIST traceable standards.

Desco Combo Tester X3+ Technology
- 7 inch color touchscreen displays test prompts and test results with resistance measurements
- Solid-state test switch maintains test accuracy and extends the lifetime of the tester
- 30 volt test signal increases test reliability

The default test limits are set to:
Wrist Straps: 750 kilohms to 10 megohms
Footwear: 750 kilohms to 35 megohms

The Combo Tester X3+ and its accessories are available as the following item numbers:

Item	Description
19266	Combo Tester X3+, North America
19267	Combo Tester X3+, without Power Cord
50182	Alvarado EDC Turnstile, 120VAC
50184	Replacement Dual-Wire Wrist Strap Jack
50185	Replacement Dual Foot Plate
50186	Replacement Foot Plate Cable
50187	Replacement Power Adapter
50189	Turnstile Mounting Kit
50417	Stand
50426	Limit Comparator for Testers
50755	ESD Glove Test Fixture
50756	Contactless Test Switch
50784	5-Pound Electrode for Limit Comparator

Packaging

1 Combo Tester X3+
1 Wall Bracket
1 Dual Foot Plate
1 Power Adapter
1 Power Cord with North America Plug (19266 only)
1 Foot Plate Cable
1 Micro USB Cable
1 Ground Cord
1 Thumb Screw
2 Mounting Anchors
2 Mounting Screws
2 Zip Ties
1 10 mm Wrist Cord Adapter (19267 only)

1. *The Combo Tester X3+ can verify single-wire and dual-wire wrist straps.*
2. *The Combo Tester X3+ will also test a Groundable Static Control Garment System. The Groundable Static Control Garment System must have an RTG of $< 3.5 \times 10^7$ ohms to meet the required limit of ANSI/ESD S20.20 tested per ANSI/ESD STM2.1 and ESD TR53.*
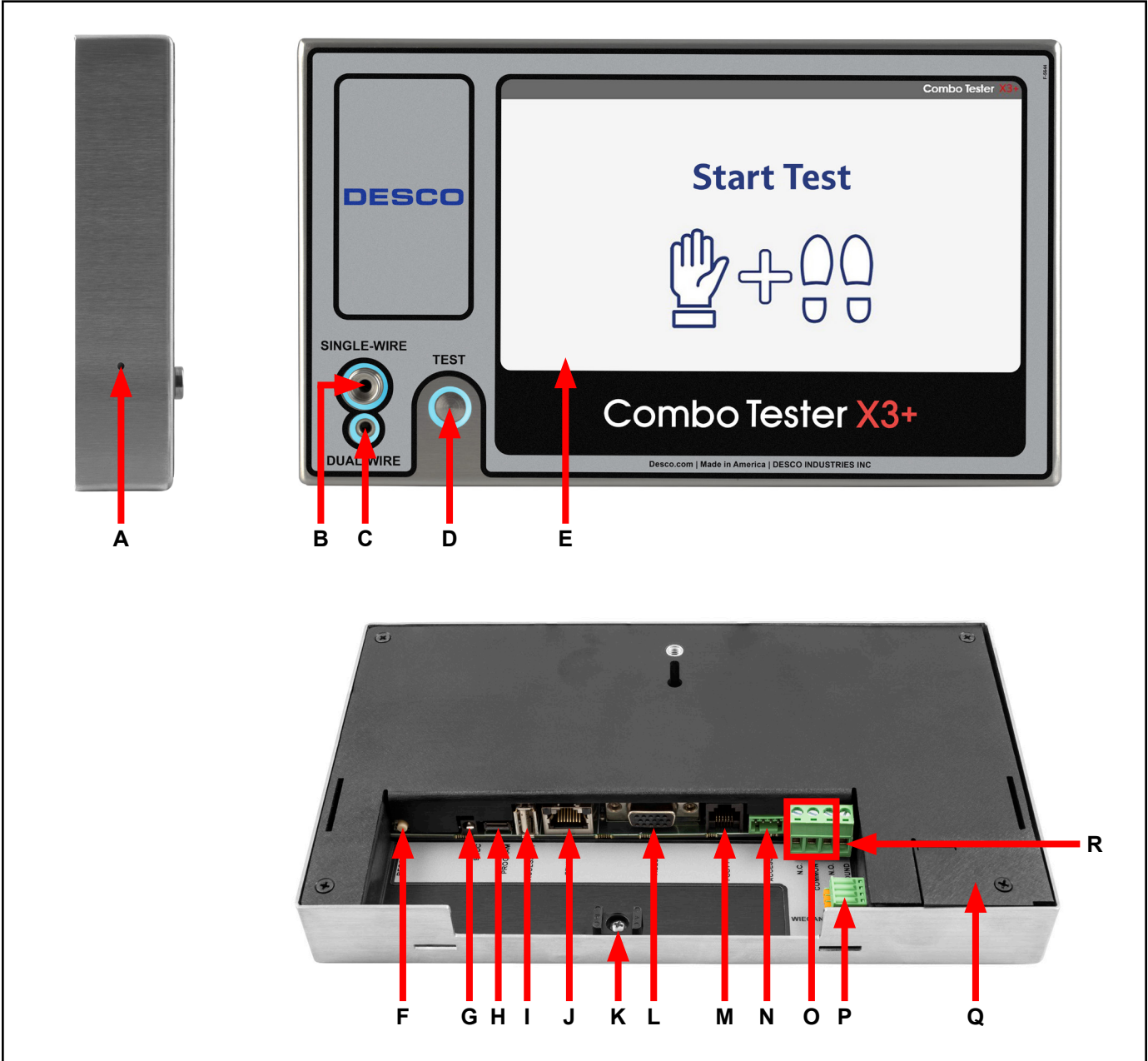
Features and Components

Figure 2. Combo Tester X3+ features and components

A. Reset Switch: Resets the Combo Tester X3+.

B. Single-Wire Wrist Strap Jack: Connect the single-wire wrist cord here to test its wrist strap. See "10 mm Wrist Cord Adapter" on page 8 if using single-wire wrist cords with a 10 mm snap termination.

C. Dual-Wire Wrist Strap Jack: Connect the dual-wire wrist cord here to test its wrist strap.

D. Solid-State Test Switch: Initiates the test sequence when a finger is placed onto it.

E. Touchscreen Display: Displays the command prompts, test results, and settings.

F. Recovery Switch: Reloads the operating system. Use only when prompted by Desco technical support.

G. 9 VDC Power Jack: Accepts the 9 VDC power adapter supplied with the Combo Tester X3+.

H. Micro USB Port: For factory use only.

I. USB Port: For factory use only.

J. Ethernet Jack: For factory use only.

K. Cable Tie Mount: Secures the cables and cords connected to the Combo Tester X3+ with the included zip ties

L. VGA Port: Outputs a mirrored image of the tester's display to an external monitor. The native video resolution is 800 x 480.

M. Foot Plate Jack: Accepts the foot plate cable connected to the dual foot plate.

N. External Test Switch Port: Accepts input from the EMIT 50755 ESD Glove Test Fixture and 50756 Contactless Test Switch.

O. Relay Terminal: Integrates with electronic door locks, lights, buzzers, etc. See "Relay Terminal" on page 5 for more information.

P. Wiegand Terminal: For factory use only.

Q. Dual-Wire Jack Access Port: Provides access to the dual-wire wrist strap jack when a replacement is needed. See "Replacing the Dual-Wire Wrist Strap Jack" on page 13 for more information.

R. Ground Terminal: Bonds the tester's enclosure to equipment ground. This connection is optional as the test circuit is grounded via the power adapter.

Installation

HARDWARE SETUP

If the Combo Tester X3+ is located near a restroom, sink or other water source, operators will need to be instructed to thoroughly dry their hands before testing. Wet hands may cause inaccurate test results and damage to the tester.

1. Connect the foot plate cable, power adapter, and ground cord (optional) to the tester.

2. Route all cables through the U-shaped opening located at the bottom of the tester and secure them to the cable tie mount with a zip tie.

3. Connect the ground cord's ring terminal to a known ground point. Connect the foot plate cable to the foot plate.

4. Power the tester by connecting its power adapter to an appropriate power receptacle. The display will turn on, and the boot sequence will initiate. "Start Test" will display on the tester after the boot sequence has completed. The blue LEDs will continuously cycle around the test switch when the ESD tester is on standby.

5. Use the included screws and anchors to secure the mounting bracket to the desired location. The screws may be used in any of the four holes shown below. Be sure to locate the bracket where operators can read the display and use the tester.
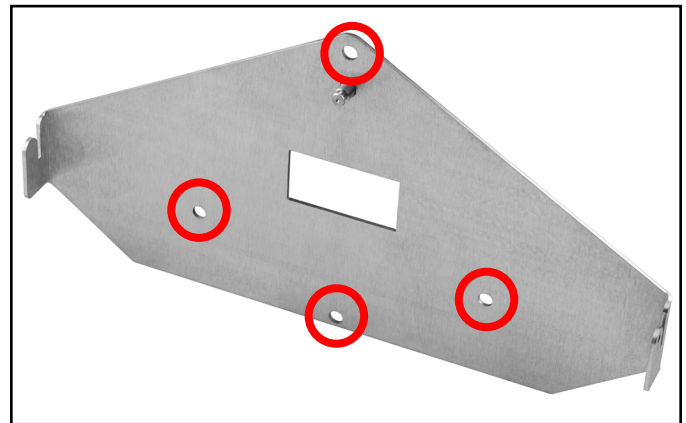

Figure 3. Mounting holes on the Combo Tester X3+ mounting bracket

6. Connect the tester to the bracket. Use the included thumbscrew to secure the tester as shown below.

Figure 4. Securing the Combo Tester X3+ to the mounting bracket

Figure 5. Using the EMIT 50417 Stand as a mounting alternative

10 MM WRIST CORD ADAPTER

A plunger and spring assembly is included with the 19267 Combo Tester X3+. Use this assembly to convert the single-wire jack on the Combo Tester X3+ to test wrist cords with a 10 mm termination instead of a banana plug. NOTE: This assembly cannot be removed once installed.

1. Insert the plunger assembly into the single-wire jack on the face of the tester. Be sure to clear the clip at the base of the plunger's shaft when inserting into the jack.

Figure 6. Inserting the plunger and spring assembly into the single-wire jack

2. The plunger will slightly protrude out of the single-wire jack when installed. Test its installation by pushing down on the plunger. It should dip and then spring back up when released.

Figure 7. Completed installation of the plunger and spring assembly

RELAY TERMINAL

The Combo Tester X3+ features a relay terminal that can be integrated with electronic door locks, lights, buzzers, etc. to control access to an area. The relay open and close (activation) time may be modified within the tester's Admin Menu.

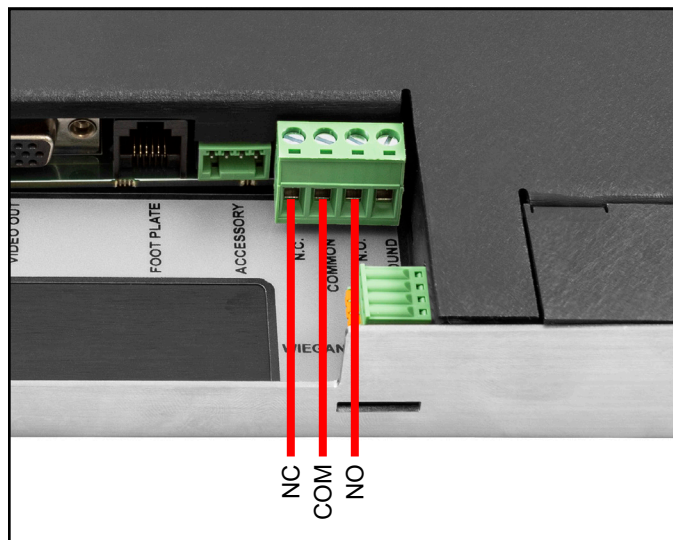| Contact Rating	1A @ 30VDC, .5A @ 125VAC
Maximum Switching Power	30W
Maximum Switching Voltage	250VAC, 220VDC
Maximum Switching Current	1A

Figure 8. Relay terminal contacts located on the back of the Combo Tester X3+.

LANGUAGE SELECTION

1. Access the Admin Menu by tapping the Combo Tester X3+ logo in the top-right corner of the touchscreen display. The default passcode is 0.

2. Tap the General tab.

3. Use the drop-down to select a desired language.

4. Tap the Save button when complete.

TEST LIMIT CONFIGURATION

The footwear and wrist strap resistance limits listed below are available in the Combo Tester X3+. The default test limits are highlighted in green.

Wrist Strap	
Low Limit	**High Limit**
100 kilohms (1.0×10^5)	10 megohms (1.0×10^7)
750 kilohms (7.5×10^5)	35 megohms (3.5×10^7)
Footwear	
Low Limit	**High Limit**
100 kilohms (1.0×10^5)	10 megohms (1.0×10^7)
750 kilohms (7.5×10^5)	35 megohms (3.5×10^7)
	100 megohms (1.0×10^8)
	1 gigohm (1.0×10^9)**

**A dirty foot plate could result in a false test result when using this test limit. Keep the foot plate clean by using 99% isopropyl alcohol. This test limit is not recommended in environments with a relative humidity greater than 50%.

1. Access the Admin Menu by tapping the Combo Tester X3+ logo in the top-right corner of the touchscreen display. The default passcode is 0.

2. Tap the Device tab.

3. Use the menu to select the desired default test type, wrist strap and footwear test limits, buzzer volume, and relay duration.

4. Tap the Save button when complete.

Figure 9. Adjusting the device settings

Operation

If the Combo Tester X3+ is located near a restroom, sink or other water source, operators should be instructed to thoroughly dry their hands before testing. Wet hands may cause inaccurate test results and damage to the tester.

1. A circling light around the test switch indicates when the tester is on standby and ready to perform a test.

2. Follow the prompt on the tester's display.

3. When performing a footwear test, be sure to place both feet on the dual foot plate (one foot per plate).

   NOTE: Keep the foot plate clean with 99% isopropyl alcohol when using the 1 Gigohm high test limit. A dirty foot plate could yield a false pass.

   When performing a wrist strap* test, be sure to completely plug in the wrist cord into the tester's jack.

4. To begin the test, use a finger to bridge the test switch's inner and outer contacts. The blue standby LED will become solid to indicate that the test has been initiated. Hold the finger down until the test results are displayed on the touchscreen.

   If the finger is removed too early, the tester's blue LEDs will blink three times to indicate that the test was not completed. DO NOT touch any other metal while performing the test as this will affect the results.

Figure 10. Bridging the test switch's contacts

5. The relay terminal will activate if the defined tests are passed (if applicable).

NOTE: Failures may be caused by dry skin or minimal sweat layer. For wrist straps, try using an approved dissipative hand lotion such as Menda Reztore® ESD Hand Lotion prior to use. Footwear test results can be improved by taking a short walk to build a sweat layer for better conductivity.

*The Combo Tester X3+ may also be used to test smocks or garments that feature a grounding mechanism for operators using a coiled cord connection.

Figure 11. Performing a test

Maintenance

To maintain optimum performance, cleaning should be performed on a regular basis. Use 99% isopropyl alcohol to clean the foot plate and test switch. Other cleaners are susceptible to leaving residue on these surfaces. NOTE: Avoid wetting or mopping the foot plate. This may yield false test results and cause damage to its internal circuitry.

REPLACING THE DUAL-WIRE WRIST STRAP JACK
The dual-wire wrist strap jack inside the Combo Tester X3+ can replaced if it begins to show wear and tear damage. The replacement dual-wire wrist strap jack is available as item 50184.

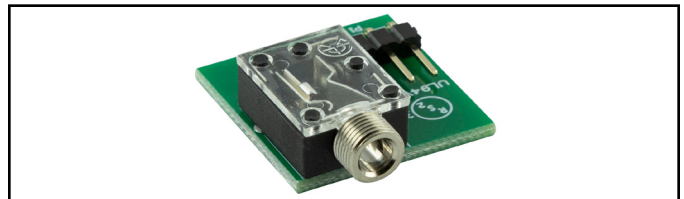*Figure 12. EMIT 50184 Replacement Dual-Wire Wrist Strap Jack*

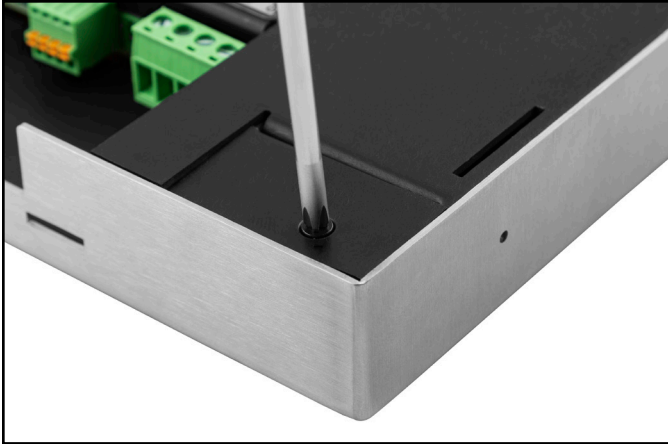1. Locate the access port on the backside of the tester and remove the flathead screw.

Figure 13. Removing the screw from the access cover

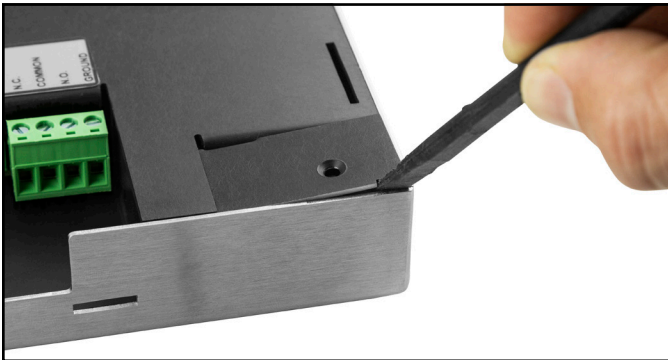2. Use a small hand tool to pry the access cover open.

Figure 14. Opening the access cover

3. Insert a small hand tool into the circular hole located on the dual-wire jack PCB, and use it to lift the PCB from the tester. Discard the used PCB.

Figure 15. Lifting the used dual-wire wrist strap jack from the Combo Tester X3+

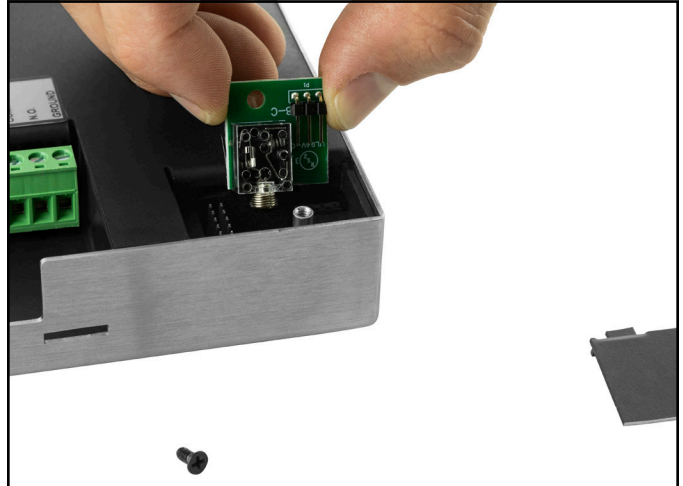4. Install the replacement PCB into the tester.

Figure 16. Installing the replacement dual-wire wrist strap jack

5. Close the access cover and reinstall the screw.

6. Perform a dual-wire wrist strap test to confirm a successful installation.

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, EMIT recommends that calibration be performed annually.

Use the EMIT 50426 Limit Comparator and EMIT 50784 5-Pound Electrode to perform periodic verification (once every 6-12 months) of the Combo Tester X3+. The Limit Comparator can be used to check the test limits of the Combo Tester X3+ without removing it from the factory floor.

See technical bulletin TB-6612 for more information.

NOTE: Calibration is not required for the temperature and humidity sensor embedded within the Combo Tester X3+.

Figure 17. EMIT 50426 Limit Comparator

Figure 18. EMIT 50784 5-Pound Electrode for Limit Comparator

Specifications

Combo Tester X3+	
Input Voltage and Frequency (External Adapter)	Power Input: 100-240 VAC, 50/60 Hz
	Power Output: 9.0 VDC, 3.0 A
	Power Adapter Cable Length: 5.0' (1.5 m)
	Power Cord Length: 7.5' (2.3 m)
Power Consumption	6.5 W
Operating Temperature	70° to 85° F (21° to 30° C) for 1 gigohm test limit 41° to 85° F (5° to 30° C) for all other test limits
Dimensions	5.3" x 9.0" x 1.1" (135 x 229 x 28 mm)
Weight	1.7 lbs (0.8 kg)
Test Accuracy	±20% for 1 gigohm footwear test limit; ±10% for all other test limits
Test Switch Voltage	5 VDC @ open circuit
Wrist Strap and Footwear Test Voltage	30 VDC @ open circuit; Test current is limited by resistors and varies on the test range setting (100 kilohms - 1 gigohm)
Available Languages	English, Spanish, Japanese, Chinese (Simplified), Turkish, Thai, French
Country of Origin	United States of America

Dual Foot Plate	
Dimensions	13.25" x 15.25" x 1.125" (337 mm x 387 mm x 29 mm)
Weight	5.5 lbs (2.5 kg)
Cable Length	7.0' (2.1 m)
Country of Origin	United States of America

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

See the Desco Warranty - Desco.com/Limited-Warranty.aspx