



WRIST STRAP/FOOTWEAR AUDITOR PMT-872A

User Manual



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PROSTAT® PMT-872A WRSIT STRAP/FOTTWEAR AUDITOR

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Before using this, or any other electronic piece of equipment, carefully read the instruction manual completely.

I. Before Using the Instrument

Examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. If any abnormal conditions exist, do not attempt to make any measurements.

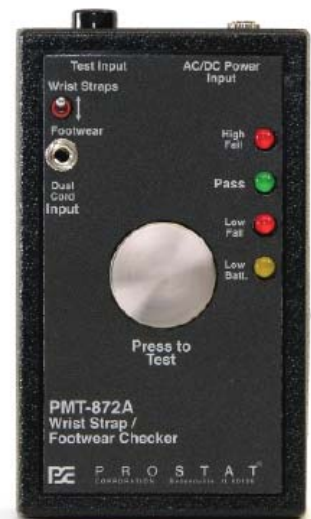
II. Safety

DO NOT use the instrument if it appears damaged, or if you suspect that the unit is not operating properly.

III. Description

The PMT-872A Wrist Strap/Footwear Checker is a highly portable, multi-function **PASS/FAIL** performance verifier. It confirms the operational resistance range of wrist straps, heel straps and ESD controlled footwear. The PMT-872A features a large test button, audible **PASS** BEEP with Green **PASS** light, Red **LOW** and HIGH Fail lights, and yellow battery low indicator. Connections are provided for an optional AC/DC Power adapter and for testing dual conductor wrist straps. A front panel toggle switch allows testing of wrist straps and footwear at one station. A footwear test plate, connector, and lead are provided.

When properly used, the PMT-872A automatically performs a Self Testing sequence to confirm proper operation and test for Low Battery Voltage. The PMT-872A may be used as either a portable unit, or it may be permanently installed at a convenient location for daily testing functions.



- A. The PMT-872A indicates whether Wrist Straps or Footwear (ESD Heel Straps and Shoes) are within acceptable resistance ranges that are pre-set in the PMT-872A, and selected by the user. Three LED's on the instrument's front panel provide PASS or FAIL indications. They are:
 1. **HIGH FAIL** (Top RED LED light) indicates that the object being tested exceeds the acceptable pre-set resistance range.
 2. **PASS** (Green LED Light) and an Audible Buzzer indicates the object is within the acceptable pre-set resistance range.
 3. **LOW FAIL** (Bottom RED LED light) indicates that the object being tested is less than the acceptable pre-set resistance range.
- B. The PMT-872A self-test sequence is activated each time the unit is used. Upon completion of an acceptable self-test and battery check, the unit's Yellow "Low Batt." LED Light will go off.
- C. The PMT-872A pre-set resistance measurement ranges for wrist straps and footwear are as follows.

Factory Default Range:

1. Wrist Straps

- a. **High FAIL** Measurements greater than 1.0×10^7 Ohms
- b. **PASS** Measurements greater than 8.0×10^5 Ohms and less than 1.0×10^7 Ohms
- c. **Low FAIL** Measurements less than 8.0×10^5 Ohms

2. Footwear

- a. **High FAIL** Measurements greater than 1.0×10^8 Ohms
- b. **PASS** Measurements greater than 8.0×10^5 Ohms and less than 1.0×10^8 Ohms
- c. **Low FAIL** Measurements less than 8.0×10^5 Ohms

Factory Adjusted Range:

3. Wrist Straps

- a. **High FAIL** Measurements greater than 3.5×10^7 Ohms
- b. **PASS** Measurements greater than 8.0×10^5 Ohms and less than 3.5×10^7 Ohms
- c. **Low FAIL** Measurements less than 8.0×10^5 Ohms

4. Footwear

- a. **High FAIL** Measurements greater than 3.5×10^7 Ohms
- b. **PASS** Measurements greater than 8.0×10^5 Ohms and less than 3.5×10^7 Ohms
- c. **Low FAIL** Measurements less than 8.0×10^5 Ohms

IV. Accuracy

A. The PMT-872A functional test ranges and accuracy are as follows:

Factory Adjusted Measurement Ranges & Accuracy:

WRIST STRAPS:	8.0×10^5 Ohms to 1.0×10^7 Ohms	$< \pm 5\%$ (Factory Default)
FOOTWEAR:	8.0×10^5 Ohms to 1.0×10^8 Ohms	$< \pm 5\%$ (Factory Default)
WRIST STRAPS:	8.0×10^5 Ohms to 3.5×10^7 Ohms	$< \pm 5\%$
FOOTWEAR:	8.0×10^5 Ohms to 3.5×10^7 Ohms	$< \pm 5\%$

B. Measurement accuracy of the PMT-872A is dependent upon three factors.

- 1. The leads must be attached properly to the PMT-872A jacks

2. The toggle switch must be in the correct position for the measurement being taken
3. Slight pressure must be applied to the test button to initiate the measurement function.

V. Battery Installation & General Maintenance

A. Battery Installation

1. Power is supplied by a standard 9 volt battery.
2. Replace the battery whenever the YELLOW “**LOW BATT**” indicator light is energized and remains **ON** during the measurement process, or when the unit has not been in operation for several weeks or months.
3. To replace the battery, remove the battery cover on the back of the instrument by applying pressure to the grid area marked with an arrow, and sliding the panel towards the bottom end of the case.
4. Carefully disconnect the instrument battery power connector from the battery and discard the battery in a manner appropriate for your locale.
5. Connect a fresh battery to the instrument battery power connector and insert the new battery into the case. Take care to position the battery connector wires to allow the battery cover to close easily.
6. Replace the battery cover on the back of the meter by positioning it in the guide grooves and sliding it forward carefully. Use the thumb of one hand to maintain downward pressure on the cover and to keep it aligned. At the same time, use the thumb of your other hand to apply pressure to the end of the battery cover and slide it into its locked position.
 - a. Do not over force the cover closed. It should snap into its locked position with firm, yet relatively gentle pressure.
 - b. If the cover does not easily lock closed, remove the cover, battery and reinsert it to obtain a better fit. Be sure connector wires are positioned to prevent obstruction to the battery compartment cover.
7. The PMT-872A is now ready for testing and use.



NOTE

An Optional AC/DC converter is available for continuous use applications. Contact your distributor for availability.

B. Initial Operational Check

Once the battery is installed in the PMT-872A check its initial function without any lead connections to the “Test Input”, as follows.

1. Position the toggle switch to the **UP** (Wrist Straps) position and push the "Press to Test" button.
 - a. The **HIGH FAIL** and LOW BATT. LED's should come on briefly upon release of test button.
 - b. The LOW BATT LED goes off. and the **HIGH FAIL** remains on.
2. Position the toggle switch to the **DOWN** (Footwear) position and push the "Press to Test" button.
 - a. The HIGH FAIL and LOW BATT. LED's should come on briefly.
 - b. The LOW BATT LED goes off and the **HIGH FAIL** remains on.



C. Cleaning

1. Wipe the surface of the footplate and the test button with a soft cloth dampened with 70% alcohol and water solution. Allow thorough drying.
2. Dust off any lint.



VI. Normal Operations

These procedures assume that a fresh battery is properly installed and the unit has been functionally tested for proper operation. For information regarding comprehensive testing of the PMT-872A, refer to Section VII "Functionally Testing the PMT-872A", on Page 13.

A. Confirming Operation Prior to Use

1. Pre-Test the PMT-872A by pressing the test button
 - a. The RED **HIGH FAIL** LED and the "Low Batt." LED will light simultaneously
 - b. If the battery is good, the Low Batt LED will go off after 1 second
 - c. The RED **HIGH FAIL** LED will stay on continuously
2. You are now ready to perform Wrist Strap or Footwear tests

B. Testing a Standard, Single Conductor Wrist Strap While Being Worn

1. Place the PMT-872A toggle switch in the UP, Wrist Strap position.
2. Attach the wrist strap ground cord to the wrist strap cuff



3. Slide the wrist strap cuff assembly over your wrist
 - a. Make sure that the wrist strap is firmly tightened around your wrist
 - b. Do not attempt to test a wrist strap that hangs loosely from your wrist
 - c. An improperly worn wrist strap will indicate a **FAIL** on the PMT-872A

4. Insert the wrist strap grounding cord male banana plug into the test “Test Input” receptacle located at the top end of the PMT-872A.

5. Push the “Press to Test” button with your index finger

- a. Press firmly, but do not apply excessive pressure
- b. You will notice that the LED’s light up while attempting to automatically “range”. With an acceptable Wrist Strap the LED light sequence will be:
 - (1) Initially, the **HIGH FAIL** and LOW BATT. LED’s should light briefly.

- (2) The **HIGH FAIL** LED goes off, the PASS LED comes on and the LOW BATT. LED remains on.

- (3) The **PASS** LED remains on and the LOW BATT. LED goes off.

- (4) An audible “Beep” begins to sound when the test is completed and the Wrist Strap is within the acceptable resistance range while being worn.



6. Once the Green **PASS** LED is stable and the audible BEEP begins to sound, the test is completed. It indicates the Wrist Strap is within the acceptable resistance range and is being properly worn.

If the Green **PASS** LED does not come on, and either **FAIL** LED lights, the Wrist Strap is unacceptable or is being worn improperly.

C. Testing a Standard, Single Conductor Wrist Strap While Holding The Cuff

1. Place the PMT-872A toggle switch in the **UP**, Wrist Strap position.
2. Attach the wrist strap ground cord to the wrist strap cuff
3. Hold the wrist strap cuff between your thumb and index finger as follows:



- a. Make sure that you hold the cuff opposite (180°) from the metal cuff buckle

NOTE

Do not test a wrist strap while holding the buckle as it may give you a false **PASS** indicator.

- b. Be sure that your thumb or finger makes direct contact with the inner surface of the cuff.
4. Insert the wrist strap ground cord banana into the test input jack

5. Push the “Press to Test” button with a finger. You will notice that the LED’s light up while attempting to automatically “range”. With an acceptable Wrist Strap the LED light sequence will be:

- a. Initially, the **HIGH FAIL** and **LOW BATT.** LED’s should light briefly.
- b. The **HIGH FAIL** LED goes off, the **PASS** LED comes on and the **LOW BATT.** LED remains on.
- c. The **PASS** LED remains on and the **LOW BATT.** LED goes off.



- d. An audible “Beep” begins to sound when the test is completed and the Wrist Strap is within the acceptable resistance range while being worn.
6. Once the Green **PASS** LED is stable and the audible BEEP begins to sound, the test is completed. It indicates the Wrist Strap from its cord connection through the cuff assembly and your hand is within the acceptable resistance range.

If the Green **PASS** LED does not come on, and either **FAIL** LED lights, the Wrist Strap is unacceptable.

7. This test may also be performed by pushing the “Press to Test” Button with the inner surface of the cuff, which eliminates the hand’s or body’s resistance from the test procedure.

D. Testing Dual Conductor Wrist Strap Assemblies

Dual conductor wrist straps are used in automatic wrist strap monitoring systems. In effect, these unique wrist strap assemblies consist of two individual conducting systems each having their own ground cord conductor, a 1 megohm resistor, and one-half of the cuff assembly. The two systems are electrically joined together at the cuff when properly worn on a human wrist.

When in use, the monitoring system measures the total resistance through one conductor of the system, across the wearer’s skin, and back through the second conductor. This forms a complete circuit. When the wrist strap is improperly worn, or not functional, a complete circuit does not exist and the monitoring system typically provides a visual and, or audible alarm.

The following procedure allows an ESD auditor to periodically check dual conductor wrist strap assemblies.

1. Individually Testing Each Conductive Section: Cuff to Plug

- a. Place the PMT-872A toggle switch in the **UP**, Wrist Strap position.
- b. Attach the wrist strap ground cord to the wrist strap cuff assembly according to the manufacturer's instructions.
- c. Insert the wrist strap grounding cord phono plug into the "**Dual Cord Input**" receptacle located on the front panel of the PMT-872A.
- d. Carefully holding the cuff assembly, press only one half of the inside cuff surface against the PMT-872A's "Press to Test" button.

**IMPORTANT NOTE**

Assuming an acceptable dual conductor wrist strap assembly, if both halves of the cuff simultaneously contact the "Press to Test" button, a false **LOW FAIL** may be indicated. This is the sign that the system halves are shorted together.

- e. If only one half of an acceptable system is being properly tested, you will see the LED's light up while attempting to automatically "range". The LED light sequence will be:
 - (1) Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
 - (2) The **HIGH FAIL** LED goes off, the PASS LED comes on and the LOW BATT. LED remains on.
 - (3) The **PASS** LED remains on and the LOW BATT. LED goes off.
 - (4) An audible "Beep" begins to sound when the test is completed and the Wrist Strap is within the acceptable resistance range while being worn.
- f. Repeat the procedure with the other half of the cuff assembly and look for the same acceptable results.
- g. If Either Half of the Dual Conductor Wrist Strap Assembly Indicates **HIGH FAIL**, the cuff may be dirty or damaged, or the conductor and resistor may be greater than 1.0×10^7 ohms.

- h. If Either Half or Both Dual Conductor Assemblies Indicate **LOW FAIL**, the two systems are shorted together. The short may be at one or more locations in the dual wrist strap assembly:
- (1) At Main phono plug
 - (2) Between Cord Conductors
 - (3) At Connection to Cuff Assembly
 - (4) Between Cuff Buckle Segments
 - (5) Between Cuff Material Segments

IMPORTANT NOTE

If a dual conductor wrist strap is tested while being worn and either conductor meets the PMT-872A resistance range setting, the green PASS LED will be indicated.

E. Testing Footwear While Being Worn

1. Place the PMT-872A toggle switch in the **DOWN**, Footwear position.
2. Connect the green, 6 foot lead to the PFP-861 foot plate by inserting the male banana plug into the snap adapter attached to the foot plate.
3. Insert the banana plug of the opposite end of the green ground cord into the PMT-872A "Test Input" jack.
4. Stand on the PFP-861 foot plate
5. Push the "Press to Test" button with your index finger. You will notice that the LED's light up while attempting to automatically "range". With acceptable Footwear the PMT-872A indications may be as follows:



- a. When footwear resistance is in the Low to Middle Portion of the Acceptable Resistance Range, the LED light sequence will be:
 - (1) The **PASS** LED and the LOW BATT. LED come on.
 - (2) The **PASS** LED remains on and the LOW BATT. LED goes off.
 - (3) The audible BEEP begins to sound indicating an acceptable resistance range.
 - b. When footwear resistance is in the High Portion of the Acceptable Resistance Range, the LED light sequence will be:
 - (1) Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
 - (2) The **HIGH FAIL** LED remains on, and the LOW BATT. LED goes off.
 - (3) The **PASS** LED comes on
 - (4) The audible BEEP begins to sound indicating an acceptable resistance range.
6. Once the Green **PASS** LED is stable and the audible BEEP begins to sound, the test is completed. It indicates the Footwear is in the acceptable portion of the resistance range.
- If the Green **PASS** LED does not come on, and either FAIL LED lights, the Footwear is unacceptable.
7. Footwear tests may be performed while standing on the foot plate with either one, or both feet. Note that tests performed while standing on the foot plate with one foot may **FAIL**, but while standing on the plate with both feet may **PASS**. The reasons for this are as follows:
- a. An individual shoe having a total resistance through the body, stocking and shoe to the plate may exceed 1.0×10^8 ohms.
 - (1) The PMT-872A will indicate **HIGH FAIL**.
 - (2) This is a correct indication.
 - b. When standing on the plate with both shoes in contact with the plate, the shoes form a "parallel" circuit where the total resistance is less than that of either shoe, plus your body's resistance.
 - (1) The total "parallel" resistance of two shoes having greater than 1.0×10^8 ohms individual resistance may be less than 1.0×10^8 ohms total resistance.
 - (2) The PMT-872A will indicate **PASS**.



- (3) This is also a correct indication.

VII. Functionally Testing the PMT-872A

- A. The PMT-872A has no internal parts you can adjust, so verification of calibration can be achieved using the following process.

If verification cannot be achieved, the unit should be returned to the supplier.

- B. A defined set of reference resistors or a decade box may be used for this procedure. The following instructions are based on use of the PAR-809B or PAR-809C Variable Resistance Reference to confirm proper operation of the PMT-872A.

1. Install two reference leads in the PAR-809B or PAR-809C Variable Resistance Reference output banana receptacles.
2. Insert one resistance reference lead into the Test Input jack located at the top end of the PMT-872A.
3. Adjust the Variable Resistance Reference to less than 7.75×10^5 Ohms
4. Set the PMT-872A Toggle Switch UP to the "Wrist Straps" position.



C. TESTING THE WRIST STRAPS "LOW FAIL" POINT

Using the metal banana plug end of the second reference lead, press the PMT-872A's "Push to Test" button and observe the instrument's indication LED lights. The following four indications should take place within approximately 1 second:

1. Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
2. The **HIGH FAIL** LED goes off, the **PASS** LED comes on and the LOW BATT. LED remains on.
3. The **PASS** LED goes off, the **LOW FAIL** LED comes on and the LOW BATT. LED remains on.
4. The **LOW FAIL** LED remains on and the LOW BATT. LED goes off.

D. TESTING THE LOW END OF THE WRIST STRAPS "PASS" RANGE

Set the Variable Resistance Reference to 1.1×10^6 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A's "Push to Test" button and observe the instrument's indication LED lights. The following PMT-872A indications should occur within approximately 1 second:

1. Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
2. The **HIGH FAIL** LED goes off, the **PASS** LED comes on and the LOW BATT. LED remains on.
3. The **PASS** LED remains on and the LOW BATT. LED goes off.
4. The audible BEEP begins to sound indicating an acceptable resistance range.

E. TESTING THE HIGH END OF THE WRIST STRAPS "PASS" RANGE

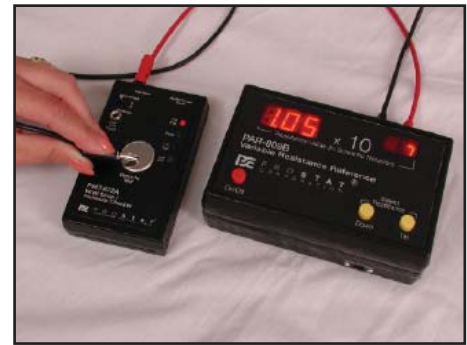
Confirm the toggle position is in the "Wrist Straps" position. Set the Variable Resistance Reference to 9.0×10^6 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A's "Push to Test" button and observe the instrument's indication LED lights. The following PMT-872A indications should occur within approximately 1 second:

1. Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
2. The **HIGH FAIL** LED goes off, the **PASS** LED comes on and the LOW BATT. LED remains on.
3. The **PASS** LED remains on and the LOW BATT. LED goes off.
4. The audible BEEP begins to sound indicating an acceptable resistance range.

F. TESTING THE WRIST STRAPS "HIGH FAIL" POINT

Confirm the toggle position is in the "Wrist Straps" position. Set the Variable Resistance Reference to 1.05×10^7 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A's "Push to Test" button and observe the instrument's indication LED lights. The following PMT-872A indications should occur within approximately 1 second:

1. Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
2. The **HIGH FAIL** LED remains on and the LOW BATT. LED goes off.



G. TESTING THE FOOTWEAR "LOW FAIL" POINT

Position the toggle switch **DOWN**, to the "Footwear: position, and set the Variable Resistance Reference to 7.75×10^5 Ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A's "Push to Test" button and observe the instrument's indication LED lights. The following three indications should take place within approximately 1 second:

1. The **PASS** LED and the LOW BATT. LED come on.
2. The **PASS** LED goes off, the **LOW FAIL** LED comes on and the LOW BATT. LED remains on.
3. The **LOW FAIL** LED remains on and the LOW BATT. LED goes off.



H. TESTING THE LOW END OF THE FOOTWEAR "PASS" RANGE

Set the Variable Resistance Reference to 1.1×10^6 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A's "Push to Test" button and observe the instrument's indication LED lights. The following PMT-872A indications should occur within approximately 1 second:

1. The **PASS** LED and the LOW BATT. LED come on.
2. The **PASS** LED remains on and the LOW BATT. LED goes off.
3. The audible BEEP begins to sound indicating an acceptable resistance range.

I. TESTING THE MID POINTS OF THE FOOTWEAR “PASS” RANGE

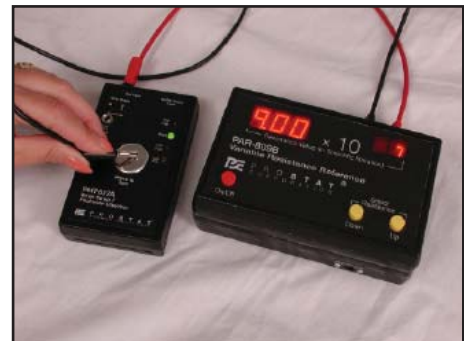
Confirm the toggle position is in the “Footwear” position. Set the Variable Resistance Reference to 9.0×10^6 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A’s “Push to Test” button and observe the instrument’s indication LED lights. The following PMT-872A indications should occur within approximately 1 second:

1. Initially, the **HIGH FAIL** and LOW BATT. LED’s should light briefly.
2. The **HIGH FAIL** LED goes off, the **PASS** LED comes on and the LOW BATT. LED remains on.
3. The **PASS** LED remains on and the LOW BATT. LED goes off.
4. The audible BEEP begins to sound indicating an acceptable resistance range.
5. Re-set the Variable Resistance Reference to 1.05×10^7 Ohms and repeat test. Indications should be the same as 1 through 4, above.

J. TESTING THE HIGH END OF THE FOOTWEAR “PASS” RANGE

Confirm the toggle position is in the “Footwear” position. Set the Variable Resistance Reference to 9.0×10^7 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A’s “Push to Test” button and observe the instrument’s indication LED lights. The following PMT-872A indications should occur within approximately 1 second:

1. Initially, the **HIGH FAIL** and LOW BATT. LED’s should light briefly.
2. The **HIGH FAIL** LED remains on, and the LOW BATT. LED goes off.
3. The **PASS** LED comes on
4. The audible BEEP begins to sound indicating an acceptable resistance range.



K. TESTING THE FOOTWEAR “HIGH FAIL” POINT

Confirm the toggle position is in the “Footwear” position. Set the Variable Resistance Reference to 1.1×10^8 ohms. Using the metal banana plug end of the second reference lead, press the PMT-872A’s “Push to Test” button and observe the instrument’s indication LED lights. The following PMT-872A indications should occur within approximately 1 second:



1. Initially, the **HIGH FAIL** and LOW BATT. LED's should light briefly.
2. The **HIGH FAIL** LED remains on and the LOW BATT. LED goes off.

PMT-872A Wrist Strap/Footwear Checker Specifications

Test Voltage & Current:	Nominal 9 volts and 0.006 μA to 1.0 mA.		
Test Voltage & Current:	One (1) standard 9-volt battery, PROCELL, Eveready #216 (NEDA 1604, JIS 006P, IEC 6F22); or, Optional AC/DC converter.		
Factory Adjusted Measurement Ranges & Accuracy:			
WRIST STRAPS:	8.0x10 ⁵ Ohms to 1.0x10 ⁷ Ohms	<±5% (Factory Default)	
FOOTWEAR:	8.0x10 ⁵ Ohms to 1.0x10 ⁸ Ohms	<±5% (Factory Default)	
WRIST STRAPS:	8.0x10 ⁵ Ohms to 3.5x10 ⁷ Ohms	<±5%	
FOOTWEAR:	8.0x10 ⁵ Ohms to 3.5x10 ⁷ Ohms	<±5%	
Toggle Range Selection:	UP for Wrist Straps and DOWN for Footwear		
Push Button:	27 mm Diameter, Metal spring loaded		
Light Indicators:	Vertically Oriented. From Top to Bottom:		
	FAIL High:	Red LED	
	PASS:	Green LED with Audible Buzzer	
	FAIL Low:	Red LED	
	BATTERY LOW:	Yellow LED (At <8.2V Battery Voltage)	
Audible Signal:	Fast, Individual “Beeping” Sound with Green PASS LED on.		
Operating Range:	40°F to 120°F (5°C to 49°C)		
Storage Temp:	-15°C to +60°C		
Relative Humidity:	0% to 90%		
Battery Life:	40 hours typical		
Dimensions:	115 mm x 69 mm x 26 mm		
Weight:	6 oz.		

NOTES



Specifications are subject to change without notice.
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P R O F E S S I O N A L S T A T I C C O N T R O L P R O D U C T S

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