

3M™ Wrist Strap and Footwear Tester 888

User's Guide



3M

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INTRODUCTION

This document serves as the user's guide for the 3M™ Wrist Strap and Footwear Tester 888 with Data Logging.

Inspection

The AC adapter provided with Wrist Strap and Footwear Tester 888 is center positive, it provides 9VDC and 1.6A power to the device, its input is AC 100 to 240V, 50/60Hz, 0.3A. When the unit is delivered, check and make sure that it has not been damaged during transit. In particular, check the accessories, panel switches, and connectors. If the unit is damaged, or fails to operate according to the specifications, contact your dealer or 3M representative.

Accessories

AC Adapter	1
RS-232 cable connection	1
USB cable connection	1
Ethernet cross over cable	1
Ferrite cord on Ethernet cable	1
8 way data cable (one end open for external device control)	1
RS-232 cable connection (one end open without connector) for card reader	1
Ground cable	1
Wall-Mounting holder	2
Wall mounting screw	8
CD Containing Data Logging Software, firmware upgrade software and User's Guide	1
Wall plug	4
Bump-on for dual cord test	1

SAFETY INFORMATION

Read, understand, and follow all safety information contained in this User's Guide prior to use of the 3M™ Wrist Strap and Footwear Tester 888. Retain User's Guide for future reference.

Intended Use:

The Wrist Strap and Footwear Tester 888 is intended to measure electrical resistance for evaluating the effectiveness of ESD shoes and wrist straps to help protect against ESD.

The tester must be setup as specified in the Wrist Strap and Footwear Tester 888 User's Guide. It is intended for use in a dry indoor commercial/industrial environment only.

Explanation of Signal Word Consequences



WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Indicates a situation which, if not avoided, could result in property damage including damage to the product itself.

EXPLANATION OF PRODUCT SAFETY LABEL SYMBOLS



Warning: Read User's Guide



Warning: Hazardous Voltage

Other Conventions:

Important Note

- It is strongly recommended that you pay attention to information identified as an "Important Note".



WARNING

To reduce the risks associated with explosion, medical device malfunction, hazardous voltage and environmental contamination:

- Read, understand, follow and retain all safety information contained in this User's Guide.

To reduce the risks associated with explosion:

- Do not use in an explosive environment. 3M™ Wrist Strap and Footwear Tester 888 is not designed to be intrinsically safe.
- Do not short-circuit used batteries, disassemble them, or throw them in a fire. Doing so may cause the batteries to explode.

To reduce the risks associated with medical device malfunction:

- Persons with heart pacemaker devices should never use this tester.

To reduce the risks associated with hazardous voltage:

- Do not use this product in an outdoor or wet environment.
- Replace power adapter if damaged.
- Do not modify or attempt to service the power adapter or tester.
- Ethernet interface not intended for use outside the building where it may be subject to lighting or power faults.
- AC adapter must have all local required regulatory certifications.
- Do not use AC adapter and/or power cord if damaged.
- When replacing batteries, turn the power switch off and disconnect all cables.
- Not intended to be serviced by the user. No user serviceable parts. Any attempt to service this device will void the warranty. Contact your 3M representative for service information.
- Always cover the battery before using the tester.
- If AC power adapter is used, remove battery before power on the unit.



CAUTION

To reduce the risks associated with environmental contamination:

- Dispose of the tester, power adapter and batteries in accordance with local, state, and federal regulations.

To reduce the risks associated with false positive test readings:

- Tester must be checked periodically to verify each test mode is functioning correctly.

To reduce the risks associated with false positive test readings:

- Perform operational verification test to ensure proper operation of the tester as required.

Explanation of Safety Label Signal Words and Symbols

	Indicates the ON side of the power switch.
○	Indicates the OFF side of the power switch.
—	Indicates DC (Direct Current).
— ⊖ ⊕	Power input connector polarity (center positive)
⊙	See User's Guide for explanation of indicator lamps

1.0 Overview

1.1 Product Outline

The 3M™ Wrist Strap and Footwear Tester 888 is a single-unit instrument designed to measure the electrical resistance of ESD shoes and wrist straps used to help protect static sensitive devices.

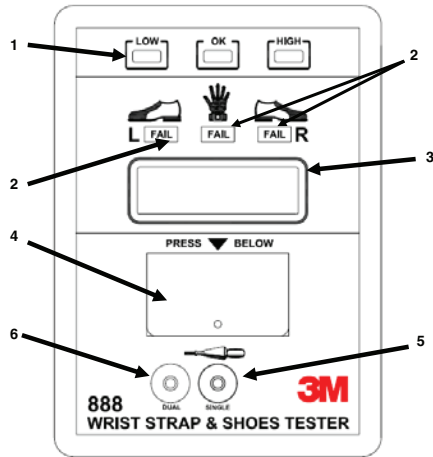
The Wrist Strap and Footwear Tester 888 features:

1. Evaluation of electrostatic protection provided by ESD shoes and wrist straps
A single device measures the electrical resistance of a body while wearing ESD shoes and wrist straps.
2. Quick Measurements – Displays test results, and makes these available for output within seconds after starting the measurement.
3. Test Result Display and Output – Displays OK, HIGH or LOW test results on panel LEDs. Test result and its resistance values can be displayed on the LCD.
4. Multiple testing threshold resistance values can be set by user either through the buttons on the left side of the tester or through a PC with a RS-232 interface. Test results are also available at an open-collector output terminal. Refer to Section 4.1, “Open Collector Output.”
5. RS-232C Interface – Test results are available to an external PC through a serial (RS-232C) interface. Refer to Section 4.2, “RS-232C Communications.”
6. USB interface – Test results can also be sent to host PC via USB interface.
7. Ethernet interface – This device can communicate with a PC via Ethernet interface, in addition to USB and RS-232 interface.
8. Interface with card reader – The device has one RS-232 that is used to read an employee's card data from a card reader.
9. Auto detect test type – Test type, such as wrist strap test, ESD shoes test and test both wrist straps and ESD shoes, can be automatically detected according to individual employee's data information.
10. Data logging – Test results which are transferred to the host PC will be recorded inside a database. The data base also store employee's information, test configurations and hardware setup.

1.2 Part Names of the 3M™ Wrist Strap and Footwear Tester 888

1.2.1 Front Panel

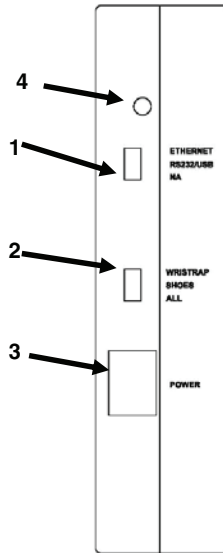
Figure 1: Front Panel of the 3M™ Wrist Strap and Footwear Tester 888



- 1. Test Result LEDs** Indicate test results according to specified resistance thresholds. If the test is below the specified low threshold, the LOW LED will light up; if the test result is above the specified high threshold, the HIGH LED will light up. If the test result is within the high and low threshold limits, the OK LED will light up.
- 2. Test Location LEDs** Indicate the test location and fail status. If your wrist strap resistance tests higher than the threshold, the wrist strap LED shown below with the hand signal will light up.
- 3. LCD** Shows measurement values and test result status. It can also display date and time, test threshold value, instruction, etc.
- 4. Touch Panel** The touch panel is one of the measurement indicators. It also initiates a test when it is pressed.
- 5. Single Cord Wrist Strap jack** Connects the single cord wrist strap cable for single cord wrist strap testing.
- 6. Dual Cord Wrist Strap jack** Connects the dual cord wrist strap cable for dual cord wrist strap testing. Please note, for the dual cord test, the user needs to apply a 3M™ Bumpon™ Protective Product (provided) to the surface of the metal plate. It is the user's responsibility to apply the Bumpon Protective Product to the metal plate, as the user will need to press the Bumpon Protective Product during the test.

1.2.2 Right Side Panel

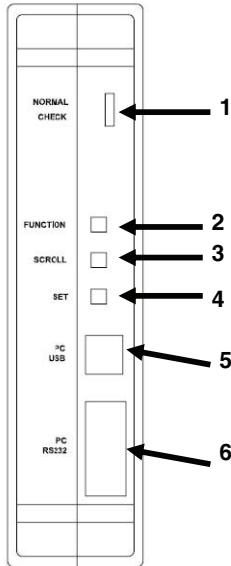
Figure 2: Right Panel of the 3M™ Wrist Strap and Footwear Tester



- | | |
|------------------------|--|
| 1. Interface selection | Slide the switch to select the communication interface with a PC, which can be either Ethernet or RS-232/USB. When switched to the upper position, Ethernet is chosen, and when switched to the middle position, RS-232/USB is chosen. When it is switched to the bottom position (NA), for Ethernet breakdown mode, the data is saved in the on board memory. When Ethernet communication is used, if the connection between the PC and this device is not established, the LOW LED will always light up. |
| 2. Test type Selection | Slide the switch to select test type (or test mode). When switched to the upper position, only the wrist strap will be tested. When switched to the middle position, only the shoes will be tested. When switched to the bottom position, both the wrist strap and shoes will be tested. |
| 3. Power Switch | Turns the 3M™ Wrist Strap and Footwear Tester 888 on and off. |
| 4. Buzzer | Audible alarm |

1.2.3 Left Side Panel

Figure 3: Left Panel of the 3M™ Wrist Strap and Footwear Tester 888



- | | |
|---------------------------|--|
| 1. Slide Switch | Slide switch to select Normal test or semi auto check test. When switched to the upper position, the normal test mode is chosen. When switched to the bottom position, the functionality will be checked with operator assistance. |
| 2. Function button | Slide the function selection button to select either the high and low limit for the wrist strap and shoe test. |
| 3. Scroll button | Scrolls to select the value of the high and low limits. |
| 4. Set button | Set the high and low limit values for wrist strap and shoe tests. Press the "Scroll" and "Set" buttons at the same time, and the LCD will display the "Date and Time" on the screen. |
| 5. USB connector (Type B) | USB interface is used to communicate with the PC, but the interface switch should be placed in the RS-232 position (middle position). |
| 6. RS-232 connector | RS-232 port is used to communicate with the PC. |

1.2.4 Bottom Side Panel

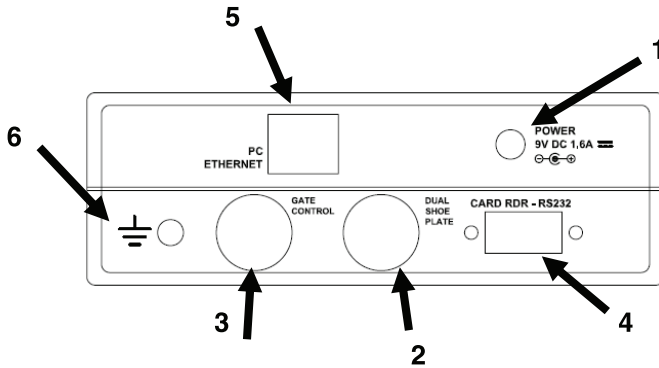


Figure 4: Bottom Panel of the 3M™ Wrist Strap and Footwear Tester 888

- | | |
|----------------------------------|--|
| 1. 9V Power Jack | AC adapter power jack (output 9V 1.6A) |
| 2. ESD shoe dual plate connector | Connects the Wrist Strap and Footwear Tester 888 to the 3M™ Dual Plate Electrode 741D. |
| 3. Signal output connector | Test result signals are available at this connector for controlling external devices, such as a door, alarms, etc. |
| 4. RS-232 connector | This is a DB9 female connector for card reader. |
| 5. Ethernet connector | This is an optional interface to communicate with the host PC. |
| 6. Ground jack | This is a ground point for the Wrist Strap and Footwear Tester 888 The tester must be connected to an external known, good ground. |

1.2.5 Back Side

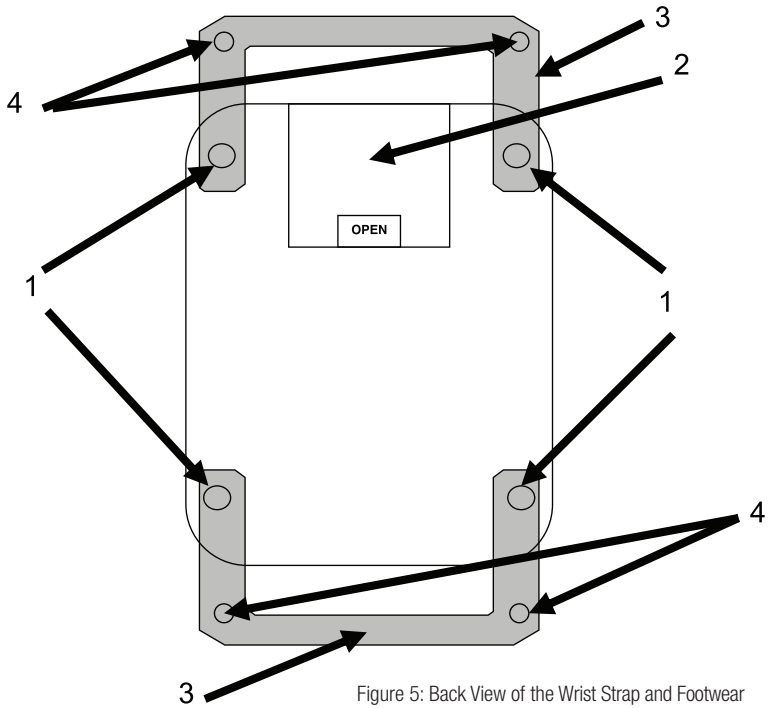


Figure 5: Back View of the Wrist Strap and Footwear Tester 888

- | | |
|-------------------|---|
| 1. Mounting Holes | These holes are used to attach the supplied wall-mount handler for wall mounting. |
| 2. Battery Cover | To operate using batteries, install four batteries. |
| 3. Handler | Used to mount the unit on the wall through the two handlers. |
| 4. Mounting holes | Used to mount the unit on the wall. |

2.0 Preparation Before Testing

2.1 Connecting the ESD Shoe Testing Plate

For ESD shoes test, customer needs to purchase a 3M™ Dual Plate Electrode 741D which is not included with this product. The part number for the Dual Plate Electrode 741D is: 98079856112. 3M provides a small connector which is shown in the picture below, Figure 6, that is used to connect the Dual Plate Electrode 741D to the 3M™ Wrist Strap and Footwear Tester 888.



Figure 6: Connector for 3M™ Dual Plate Electrode 741D

Signals in the connector are shown in Figure 7:

Pin 1: left shoe

Pin 3: right shoe

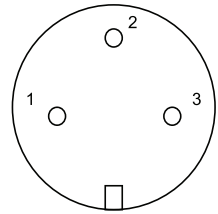


Figure 7: 3M™ Dual Plate Cable Adaptor Connector

Connection between the Wrist Strap and Footwear Tester 888 and the Dual Plate Electrode 741D is:

1. Connect the female connector above to the cable provided with the Dual Plate Electrode 741D.

Important Note: ESD wrist straps can be tested while the Dual Plate Electrode 741D and the cable are connected.

The table below shows the connection between the Dual Plate Electrode 741D connector on the casing and internal jumper on the PCB

Pin (dual plate connector)	J2 (on PCB)	Description
1	1	Shoe left
3	2	Shoe right

2.2 Connecting to Card Reader

There is one DB9 connector at the bottom of the unit that is used to connect the RS-232 card reader. The RS-232 signals and pin configuration is shown in Figure 8. Only three signals are used. A cable connects to the DB9 as provided, the other end of this cable is open so users can connect it to different types of card readers. Please refer to Table 7 for the signal configuration.

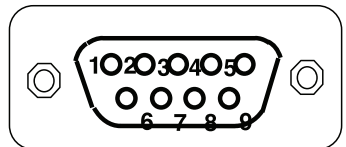


Figure 8: Card Reader Connector

Table 7: Signals for Card Reader Connector

Pin	Signal	I/O	Description
3	RxD	IN	Receiving data
5	GND	GND	Signal ground
9	5V	OUT	Power supply to card reader
Other pins are not used			

2.3 Connecting Host Computer

This 3M™ Wrist Strap and Footwear Tester 888 provides three options for users to communicate with a host : RS-232, USB and Ethernet. Connectivity is based on the convenience and hardware availability. Cables are provided and the user can easily find the connector’s label on the device for each interface.

2.4 Power Preparation

2.4.1 Installing and Replacing the Batteries

Important Notes:

- *For proper care and handling of the batteries, turn the power switch off and disconnect the all cables before beginning. Also, after replacing the batteries, always replace the battery cover before using the device.*
- *When replacing the batteries, only install new batteries and do not mix different types of batteries. Check the battery polarity carefully when inserting the batteries.*
- *Do not short-circuit used batteries, disassemble them, or throw them in a fire.*
- *Keep used batteries out of reach from children. Dispose of used batteries according to your company’s battery recycling guidelines. Dispose of them in the prescribed manner and in the proper location.*
- *If the 3M™ Wrist Strap and Footwear Tester 888 will not be used for long periods of time, remove the batteries to prevent possible corrosion caused by battery leakage.*
- *When using the AC adapter, remove the batteries from the device to prevent corrosion due to possible battery leakage.*
- *Follow your company’s battery recycling guidelines.*

This tester can be operated from four “AA” batteries.

The device can also be powered by 9V Adapter. AC adapter should be removed when the batteries are installed, otherwise the battery power is drained. Follow the procedures below to install the battery.

1. Confirm that the power switch is turned OFF.
2. Disconnect all cables from the tester.
3. Remove the battery cover from the rear panel, and insert four “AA” batteries.
4. Replace the battery cover securely.

There is a coin-style 3V lithium battery installed in the unit for real time clock circuitry power supply.

2.4.2 AC Adapter Connection

This tester can be operated using the supplied AC adapter. The AC adapter plug is center positive. Follow the instruction below to install the power adapter.

1. Confirm that the power switch is turned OFF.
2. Connect the output plug from the AC adapter to the power jack on the bottom side panel.
3. When using the AC adaptor, remove the batteries from the device to prevent corrosion due to possible battery leakage.

2.5 Ground Connection

The device provides one ground jack at the bottom of the unit (Figure 4). User must connect one end of the ground cable (provided) to this jack, the other end of ground cable to a known, good ground.

2.6 Threshold Resistance Settings

The test results indicated by the front panel LEDs and LCD are determined by comparing of the measured value with the threshold resistance settings (high and low limits).

LOW: the measured resistance is below the low limit.

OK: the measured resistance is between the high and low limit.

HIGH: the measured resistance is above the high limit.

2.6.1 ESD Wrist Strap Test and Shoes Threshold Resistance Settings

The high limit (WRIST/SHOE HIGH) and the low limit (WRIST/SHOE LOW) can be selected for wrist strap testing by pressing the buttons on the left side panel (Figure 3).

When the “Function” button is pressed, LCD will display the current value of limit for high or low. It starts from “wrist strap low limit”, is then followed by “wrist strap high limit”, The sequence is shown below.

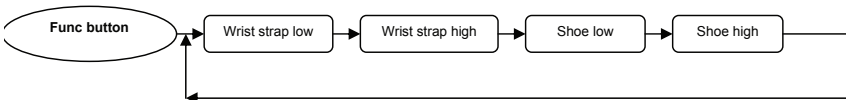


Figure 9: Sequence of FUNC Button When Pressed

When the “Scroll” button is pressed, the LCD will show the next available values for high or low limits. The available setting for wrist low, wrist high, shoe low and shoe high is in the table below.

Table 8: High and Low Limit Values Available for Wrist Strap and Shoes

Wrist low limit	500KΩ, 750KΩ
Wrist high limit	2MΩ, 5MΩ, 10MΩ, 25MΩ, 35MΩ, 50MΩ, 75MΩ, 100MΩ
Shoe low limit	100KΩ, 500KΩ, 750KΩ, 1MΩ
Shoe high limit	2MΩ, 5MΩ, 10MΩ, 25MΩ, 35MΩ, 50MΩ, 75MΩ, 100MΩ

When the “Set” button is pressed, the current displayed high or low limit values will be saved and be valid for use during the next testing.

User should select the high or low threshold before testing. The selected value will be kept inside the EEPROM as the default value for use during the next testing.

Important Notes: Factory default settings are 35 MΩ for both SHOES HIGH, 10MΩ for WRIST HIGH limit, and 500kΩ for SHOES LOW limit and 750KΩ for WRIST LOW limit.

2.7 Test Type Selection

There are three test modes that can be selected: “wrist only”, “shoes only” and “All”. The description of each test is show in the table below.

Table 9: Available Test Types

Testing Thresholds	Description
Wrist only	The test will only perform for wrist strap
Shoe only	The test will only perform for left and right shoes
All	The test will perform for both wrist strap and shoes

To select the test type, slide the switch on the side of the 3M™ Wrist Strap and Footwear 888 to the proper test type setting.

The test type can be automatically detected when the user scans an identification card. Because the user’s information is stored inside the database, the device can retrieve the test type information from the database and perform the test accordingly.

2.8 Interface Selection

Three communication interfaces can be used to communicate with the host PC, Ethernet, RS-232 and USB. User should choose one before testing by selecting the positions of the slide switch on the right side of the panel. Refer to Figure 2.

2.9 Check Selection

There is a slide switch on the left side of panel, that is used to select for either normal operation or semi auto functionality check. User should always set to “normal” for testing. Only when the user wants to check or test the basic function of the device, then “check” shall be selected.

2.10 Turning Power On and Off

- **Turning Power On** – Set the power switch at the right side panel to the ON position (I).
- **Turning Power Off** – Set the power switch at the right side panel to the OFF position (O).

2.11 Wall Mounting

The two supplied wall mount handlers allow the tester to be easily mounted on the wall while still being easy to remove. As shown in Figure 5, the handlers are affixed to the unit with four screws at the back of the case, then the handlers together with the unit, can be attached to the wall with four screws. The procedures to install the handler are as follows:

First, unscrew the four corner screws at the back of case, which are shown in Figure 10.

Figure 11 illustrates how to use a cross type of screw driver to unscrew one corner of the back panel.



Figure 10: Back of the 3M™ Wrist Strap and Footwear Tester 888 Case

Second,



after

Figure 11: Unscrew The Case

removing the four screws, place one handler on one edge of the back panel and then screw the handler onto the back panel, which is shown in Figure 12.



Figure 12: Install Handler

Use the same method to attach the other handler on the other side of back panel, which is shown in Figure 13.



Figure 13: Install the Other Handler

Once both handlers are installed on the back panel, the whole unit shall be easily mounted to the wall with the two handlers using the holes indicated with white circles in Figure 14.

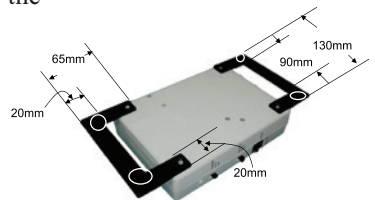


Figure 14: After Installation of the Two Handlers

Figure 16 shows the entire unit after being mounted to the wall.

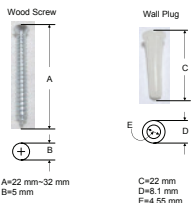


Figure 15: Mounting Screw and Wall Plug



Figure 16: Wall Mounted Unit

3.0 Testing

The test can be performed test for ESD wrist strap and shoes at the same time within seconds or individual tests for wrist strap or shoes only.

3.1 ESD Wrist Strap (Single Cord) and Shoes Testing

Important Note:

- *Use single-conductor wrist straps only on the middle jack of the front panel.*
- *Make sure the jack for the dual cord wrist strap is empty.*
- *The single cord wrist strap jack will not work if the dual cord wrist strap is connected to the dual cord jack.*

This procedure tests the effectiveness of an ESD protective wrist strap, and displays the Pass or Fail result. The actual measured resistance value will be shown on the LCD screen if the user continues to press the metal plate after testing. Whether Pass or Fail is shown, all test results and measured resistance values, test date and time, card number and other information will be sent to a host PC for data logging. Follow the procedure below to perform a test.

1. Insert the banana plug end of the single wrist strap into the middle jack on the front panel.
2. Scan your card ID.
3. Press the center of the metal panel with your finger. Continue pressing the touch panel as long as the LCD shows “Hold”.
4. When measurement is completed (the “hold” indicator goes away from LCD screen), test Pass/Fail result will be shown, if the test is passed, the LCD shows “Pass”, while if it fails, the LCD will display “Fail”, the actual measured resistance value will be displayed if user keeps pressing the metal plate.
5. LEDs will indicate test results. The top row of the LEDs on the front panel shows the test results. Green LEDs mean Pass, red LEDs mean Fail. However if the device failed, the left red LED will light up if the measurement value is below the low limit. The right red LED will light up if the measurement value is above the high limit.
6. The second row of LEDs will indicate the failure location. If the test fails on the left shoe, the left red LED will light up. If the right shoe fails, the right red LED will light up. If the wrist strap fails, the middle red LED will light up.
7. The test result status, along with their individual measurement value, will be sent to a host PC for data logging.
8. When the test is complete, the results are displayed and the LCD display will be changed to display “ready” for the next test. It will stay here until the next test is started by scanning in the next user’s card ID.

Important Notes:

- *The high end of the measurement range of the 3M™ Wrist Strap and Footwear Tester 888 is 100.0 MΩ. If the measured value exceeds this limit, “Over Val” is displayed on the LCD.*
- *If the user removes their finger too soon, or if not enough pressure is applied to the touch panel, the test result may fail or the measured resistance value may not be accurate. In this case, repeat the test.*

3.2 Individual ESD Wrist Strap and Shoes Testing

The device can test wrist straps and shoe testing separately by setting the test mode properly, please refer to Section 2.7 for Test Type Selection. The test procedure for the ESD wrist strap is similar to Section 3.1, and only the wrist strap test result and measurement values will be displayed on the LCD and sent to the host PC. Similar results will apply to shoe testing.

3.3 ESD Wrist Strap (Dual Cord) Testing

Important Note: Use dual-conductor wrist straps only on the left jack of the front panel.

Make sure the single cord wrist strap is removed before attaching the dual cord wrist strap. Insert the dual cord wrist strap into the left jack. The 3M™ Wrist Strap and Footwear Tester 888 can now perform the test for dual conductor wrist straps.

The test procedure for ESD dual cord wrist strap is as follows:

1. Select the required threshold resistance values. Refer to Section 2.6, “Threshold Resistance Settings.”
2. Insert the dual cord plug end of the wrist strap into the left jack on the front panel.
3. Scan your card ID.
4. Press the 3M™ Bumpon™ Protective Product on the metal panel with your finger. Release when you see “Press Metal” on the LCD. This means the wrist strap test is finished.

Important Note: For dual cord test, the user needs to apply the Bumpon protective product (provided) to the surface of the metal plate. The user can apply the Bumpon protective product, so long as the Bumpon protective product is on the metal plate. User needs to apply the Bumpon protective product before performing the test.

5. Then press the metal plate immediately for the shoes test. Continue pressing the metal plate so long as the LCD shows “Hold”.

Following steps 5 through 9 as shown in Section 3.1. (Reference steps 5-9)

4.0 External Output and Input Function

4.1 Open Collector Output

Important Note:

- Always turn the power switch OFF when connecting the 3M™ Wrist Strap and Footwear Tester 888.
- To avoid damage to the tester, do not apply more than the rated voltage and current to the OUTPUT connector.

Test results are available at the OUTPUT connector. By providing external power, a relay or sequencer can be controlled to open and close an automatic door.

After a measurement is taken, if the test result is OK, the photo darlington optocoupler controlling the output will turn ON. The photo darlington optocoupler functions as a switch between the output signal and external or internal ground. When the test result is OK, current flows from the output terminal to the internal or external ground. Please refer to Figure 17.

Test Result Output Terminal

Open Collector Output Ratings Absolute maximum 30VDC, 150 mA.

Internal Circuit

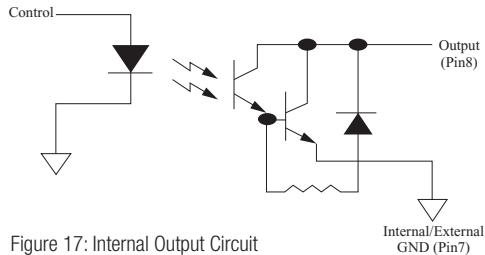


Figure 17: Internal Output Circuit

Example connection to doors

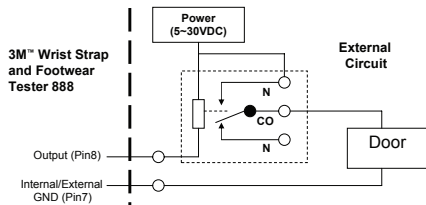


Figure 18: Example Of Connection To Doors

4.1.1 Test Result Output Settings

Using tweezers, select the test type, refer to Section 2.7, by choosing the correct switch position on the right side panel.

ALL: Both shoe and wrist strap test results are output.

WRIST: Only wrist strap test result is output.

SHOES: Only shoe test results is output.

The OUTPUT terminal transistor will not turn on unless the test type switch setting corresponds with a “Pass” result.

4.1.2 Open-Collector Output

- When the test type switch is set to **ALL**: The output photo darlington optocoupler switches on when the results of both the shoe and wrist strap tests are OK.
- When the test type switch is set to **WRIST**: The output photo darlington optocoupler is turned on when the result of a wrist strap test is OK.
- When the test type switch is set to **SHOES**: The output photo darlington optocoupler is turned on when the result of a shoe test is OK.

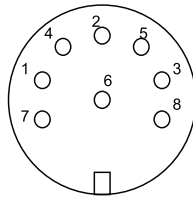
4.1.3 Signals and Pin Configuration of Gate Control Connector

There are 3 sets of output signals which can be used to control external devices, such as Gate, Red lamp, Green lamp, etc. The 3 sets of output signals are using the same type of circuit which is shown in Figure 17. Please refer to Table 10 and Figure 19 for pin configuration and signals description.

Table 10: Output Signals

Pin	Signal	J7 pins (PCB)	Description
1	Red-	9	Signal can be used to control external Red lamp for test fail status, negative terminal
2	Red+	8	Together with Red- to control external Red lamp, positive terminal
3	Green-	6	Signal can be used to control external Green lamp for card scan PASS status, negative terminal
4	Green+	5	Together with Green- to control external Green lamp, positive terminal
5	GND	4	System ground signal
6	Sense	3	Sense any TTL logic level of external device (space)
7	Door-	2	Signal can be used to control external door, negative terminal
8	Door+	1	Together with Door- to control external door, positive terminal

Figure 19: Gate Control Signals Connector



4.2 RS-232C Communications

Important Notes:

- *Always turn the power switch OFF when connecting the 3M™ Wrist Strap and Footwear Tester 888. To avoid damage to the tester, do not apply more than the rated voltage and current to the OUTPUT connector.*
- *To avoid damage to the tester, do not input voltage to the RS-232C terminal.*
- *When connecting the RS-232C cable, always secure with the thumb screws.*
- *To use the communication function, the unit must be operating with the AC adapter connected.*
- *Turn OFF the power to all devices before plugging in or unplugging any of the interface connectors.*

Test results can be transferred to a PC by RS-232C communications. Communications can begin when the tester is operating.

Specifications

The RS-232C settings of the tester are as follows. Serial port settings on the PC must be set to match the following settings.

Transmission speed	9600 bps
Data length	8 bits
Stop bits	1 bit
Parity bit	None
Handshaking	None (no X-flow or hardware)
Delimiters	Receive: CR+LF, CR. Transmit: CR+LF
Connector	9-pin D-sub male, accepts M2.6 screws

PC Connection

The RS-232C signal wires used are as follows (no other lines are used).

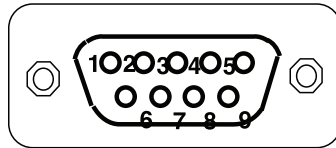


Figure 20: RS-232 Connector to Host PC

Pin	Signal	I/O	Description
2	TxD	IN	Transmit data
3	RxD	OUT	Receiving data
5	GND	GND	Signal ground
Other pins are not used			

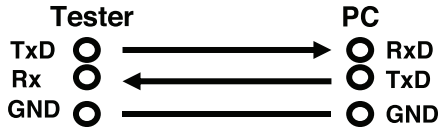


Figure 21: RS-232 to Host PC Signals Direction

Important Notes: The 3M™ Wrist Strap and Footwear Tester 888 connects to the PC through a straight cable.

4.3 Card Reader Technical Specifications

Serial Interface Specification	Bit Rate - 9600
Word Length	Data Format - 8 Parity Bit - None Stop Bit - 1
Proximity Card Reader Data	Length of characters of the card contents

4.4 PC System Requirements

Single Station Operation – Requires one communication ports available (COM1) or USB or Ethernet port for Multiple Station Operation.

5.0 Specifications

5.1 Measurement Section

The measurement resistance range is automatically selected from the following table according to the actual measured value. The resistance range can be set manually.

Maximum Measurement Resistance Range is 100k Ω ~ 100M Ω

1-M Ω Range	Max. display value: 1.00 M Ω (0.01-M Ω resolution)
10-M Ω Range	Max. display value: 10.0 M Ω (0.1-M Ω resolution)
100-M Ω Range	Max. display value: 100M Ω (1-M Ω resolution)

Testing Thresholds

Wrist Strap Test	Lower limit: 500K Ω or 750K Ω
	Higher limit: 2M Ω ,5M Ω ,10M Ω ,25M Ω ,35M Ω ,50M Ω ,75M Ω ,100M Ω
Shoe Test	Lower limit: 100K Ω , 500K Ω , 750K Ω , 1M Ω
	Higher limit: 2M Ω ,5M Ω ,10M Ω ,25M Ω ,35M Ω ,50M Ω ,75M Ω ,100M Ω

5.2 General Specifications

Ambient altitude	Up to 2000 m
Power Supply	1) AC adapter. Input: 100–240, 50/60Hz, VAC; Output: 9VDC @ 1.6 A rated load; Output plug polarization: center positive. AC adapter must have all local required regulatory certifications 2) 4 AA batteries
Applicable rated pollution degree	Degree 2
Dimensions	137 mm W X 188 mm H X 46 mm D
Mass	Approx. (540g)
Wrist Strap Banana Jack	4.20 mm
Interface	RS-232C, USB, Ethernet and open collector output
Accessories	AC Adapter, RS-232 cable, USB cable, Ethernet cross over cable, 8 way data cable (one end open for external device control), RS-232 cable connection (one end open without connector) for card reader, Ground cable, Wall-Mounting holder, Wall mounting screw, CD (Containing Data Logging Software, firmware upgrade software and Operating Instructions), Wall plug 3M™ Bumpon™ Protective Product for dual cord test.

6.0 Maintenance & Service

6.1 Battery Replacement

Important Notes:

- *Remove the batteries before storage to prevent possible corrosion caused by battery leakage if the 3M™ Wrist Strap and Footwear Tester 888 will not be used for a long period of time.*
- *When using the AC adapter, remove the batteries from the tester to prevent corrosion due to possible battery leakage.*
- *Check the battery polarity carefully when inserting the batteries.*
- *Do not short-circuit used batteries, disassemble them, or throw them in a fire.*
- *Keep used batteries away from children. Dispose of used batteries according to your company's requirements.*

6.2 Before Returning the Tester for Service

Problem	Items to check
Measurement does not start when pressing the touch panel	Are the batteries depleted? Is the AC adapter connected? (Sec. 2.4.2) Is the power switch ON? (Sec. 2.10)
Abnormal measurement values	Is the shoe testing plate connected? (Sec. 2.1) Is the ground cable connected to a known good ground? (Sec. 2.5)
Abnormal test results	Are the threshold resistance selections correct? (Sec. 2.6)
Test results are not available at OUTPUT terminal	Is the SIGNAL OUT switch selection correct? (Sec. 2.7 and 4.1.1)
RS-232C communication inoperable	Are the serial communications settings correct? (Sec. 4.2) Is a straight cable being used for the connection? (Sec. 4.2)

6.3 Service

For repair or calibration service, contact 3M Electronics Materials Solutions Division, Customer Service 1-866-722-3736.

6.4 Cleaning

Gently wipe dirt from the surface of the unit with a soft cloth moistened with a small amount of water or mild detergent.

6.5 Ordering information

Stock Number: XA006712591

Regulatory Information

cULus Statement

Meets cULus requirements.

WEEE Statement

The following information is only for EU-members States: The mark shown to the right is in compliance with Waste Electrical and Electronic Equipment Directive 2002/96/EC (WEEE). The mark indicates the requirement NOT to dispose the equipment as unsorted municipal waste, but use the return and collection systems according to local law.

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