

SHIELDED BAG TEST KIT

PBT-531

User Manual



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PROSTAT® PBT-531 SHIELDED BAG TESTER

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I. Introduction

The Prostat PBT-531 is a multi-purpose portable tool that has a variety of uses:

- When used with the supplied PBF-520 Shielding Bag Test Fixture, a storage oscilloscope and a computer the system can be used to test the discharge shielding properties of packaging materials based on ANSI/ESD STM 11.31.
- The PDS-510 Discharge Simulator can perform two pin manual HBM testing on ESD sensitive devices up to 4,000 volts. (See ANSI/ESDA/JEDEC JS-001 – Human Body Model Testing).
- The PDS-510 comes with a precision DC power supply that can be used to charge conductive and dissipative materials.

WARNING

As with any electrical device, use proper electrical precautions to avoid personnel shock.

Operating discharge simulators such as the PDS-510 HBM Discharge Simulator can result in electromagnetic interference (EMI). Individuals equipped with a heart pacemaker must not operate the instrument or be in the vicinity while it is being used.

WARNING

Do not operate the PDS-510 with the cover removed. Internal voltages as high as 4,000 volts are present when powered on. This could present a shock hazard to personnel.

WARNING

This equipment must not be operated in any environment where flammable gases or fumes are present as this represents a safety hazard.

SERVICE

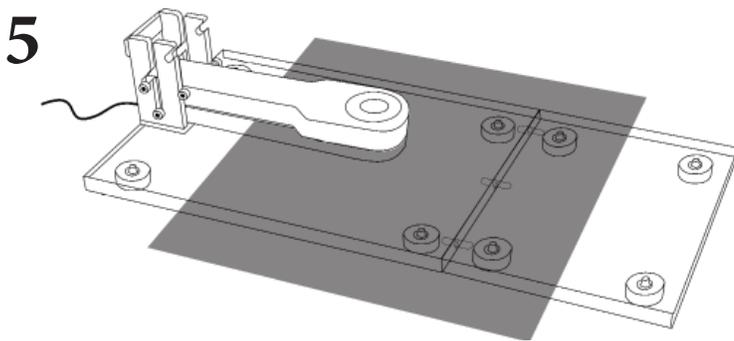
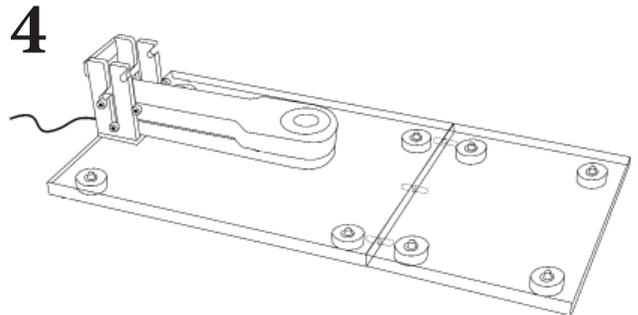
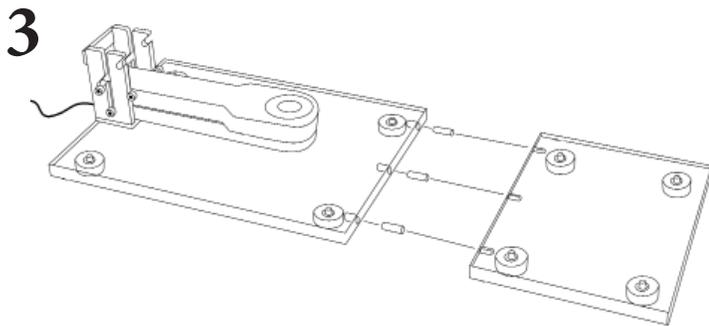
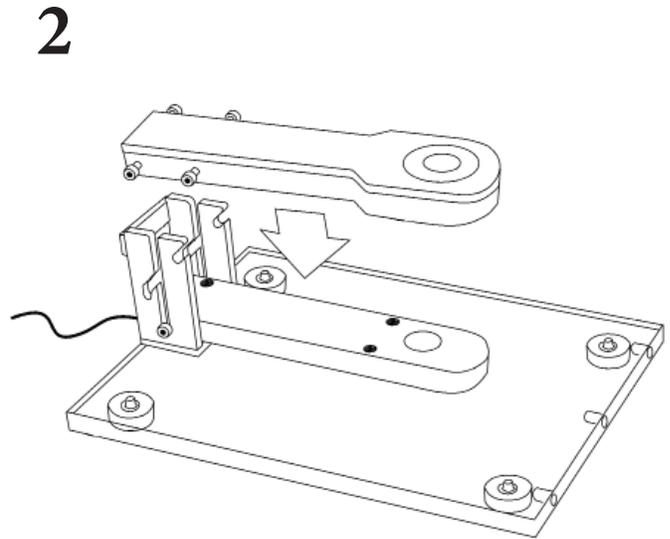
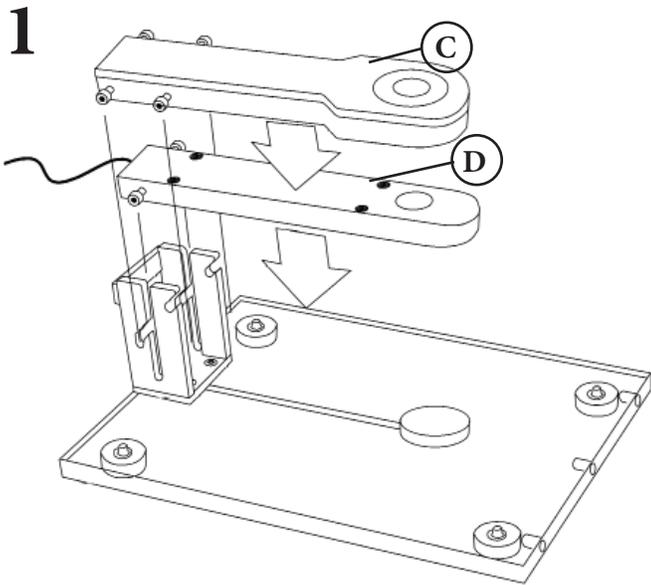
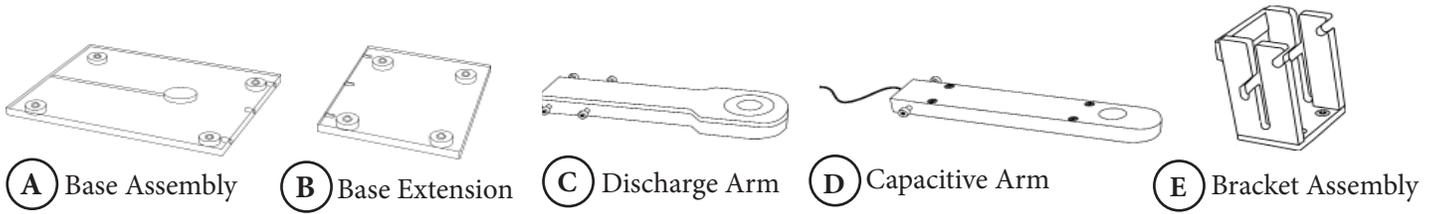
Do not attempt to service this PDS-510 yourself. Opening the covers of the unit may expose you to high voltages and possible electric shock. If the unit requires service contact Prostat for assistance. Opening the cover without authorization will void the warranty.

II. Components Included with the PBT-531

- PDS-510 HBM Discharge Simulator
- PBF-520 Shielded Bag Fixture
- Tektronix® CT1 Current Probe (Part of the discharge are assembly)
- PicoScope® Oscilloscope from Pico Technology®
- USB Drive with “Waveform Verification Setup” and “Shielding Bag Test File” files for PicoScope
- Connection and Grounding Accessories
- PRS-801-W Conductive Rubber Electrode
- PBT-500C Carrying Case

Note: Computer, Laptop or Tablet not included.

III. Assembly Instruction for the PBF-520 Shielded Bag Fixture



IV. Pre-Test Setup

- A. Attach the supplied red test lead from the PDS-510's red HBM Output to the red connector on the Discharge Arm (C) of the PBF-520 fixture. (Figures 1 and 2).
- B. Attach the supplied (short) green lead to the ground connector on the PDS-510 and the other end to the ground connection point on the Base Assembly (A) of the PBF-520 fixture.



Figure 1: Connect the short red lead to the HBM Output connector on the PDS-510

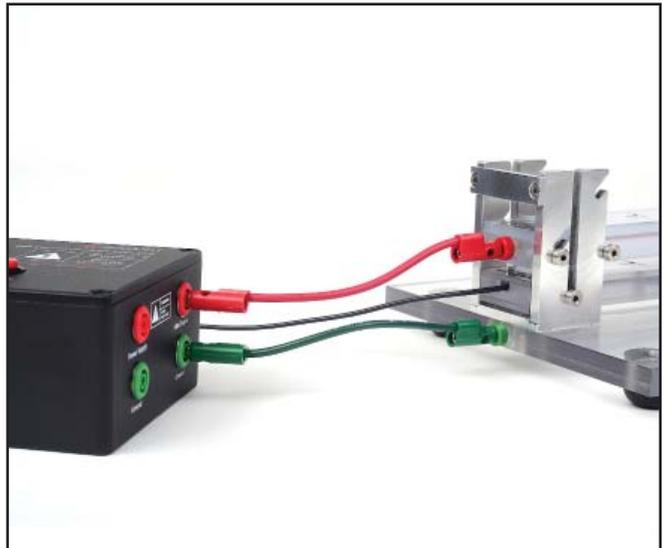


Figure 2: Connect the other end of the red lead to the Discharge Arm. Connect the short green lead to the base assembly.

- C. Attach a second (long) green ground lead from the open PDS-510 ground connector to a known AC ground using the Q007B Grounding Cube (Figures 3 and 4).



Figure 3: Connect the long green lead from the

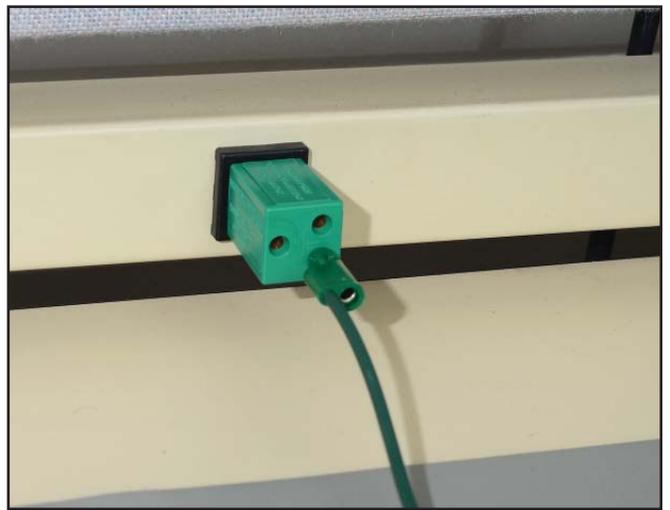


Figure 4: Connect the other end of the long green ground lead to the Q007B of an outlet.

- D. Connect the current probe coming from the Capacitive Arm to the male end of the 50-ohm terminator (Figure 5).

- E. Connect the female end of the 50-ohm terminator to Channel A of the PicoScope (Figure 6).
- F. Connect the supplied USB cable from the PicoScope unit to a computer.



Figure 5: The 50 ohm terminator connects to the current probe.

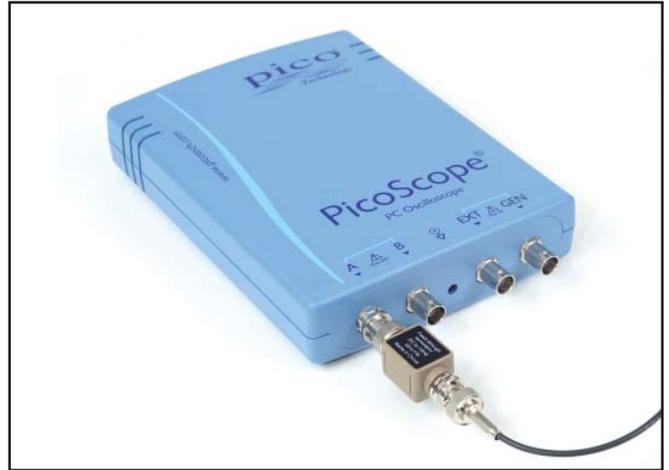


Figure 6: Connect the female end of the 50-ohm terminator to Channel A of the PicoScope.

V. System Verification Test

- A. Install the PicoScope software onto the computer by downloading it from Pico's website at <https://www.picotech.com/downloads>. Use the version that is closest to the model of your Pico Scope.
- B. Insert the supplied USB Thumb Drive and copy the 3 files named "Waveform Verification Setup", "Shielding Bag Test File" and "Shielding Bag Test File with Manual Cursors" to your computer's desktop.
- C. Launch the PicoScope software. **Note:** It is recommended that you launch the Pico software first and then open the files from the thumb drive.
- D. From the PicoScope software, click on File > Open and select the "Waveform Verification Setup file" from the desktop
- E. Turn on the PDS-510 by sliding the Main Power switch to the ON position on the side of the meter.
- F. Switch the POWER to the ON position.
- G. Switch the RANGE to the HIGH position.
- H. Switch the HIGH VOLTAGE to the ON position.
- I. By using the knob, adjust the voltage to 1.00 (1,000 volts).
- J. In the PicoScope software, if needed, move the yellow trigger icon above the scope's zero line (0.2A) on the left vertical scale (Figure 7).
- K. Ensure that the scope horizontal scale is set to 100 ns per division (Figure 7).
- L. Without inserting a shielded bag onto the fixture, set the Discharge Arm onto the Capacitive Arm. Set the 5 lbs Electrode on top of the Discharge Arm.

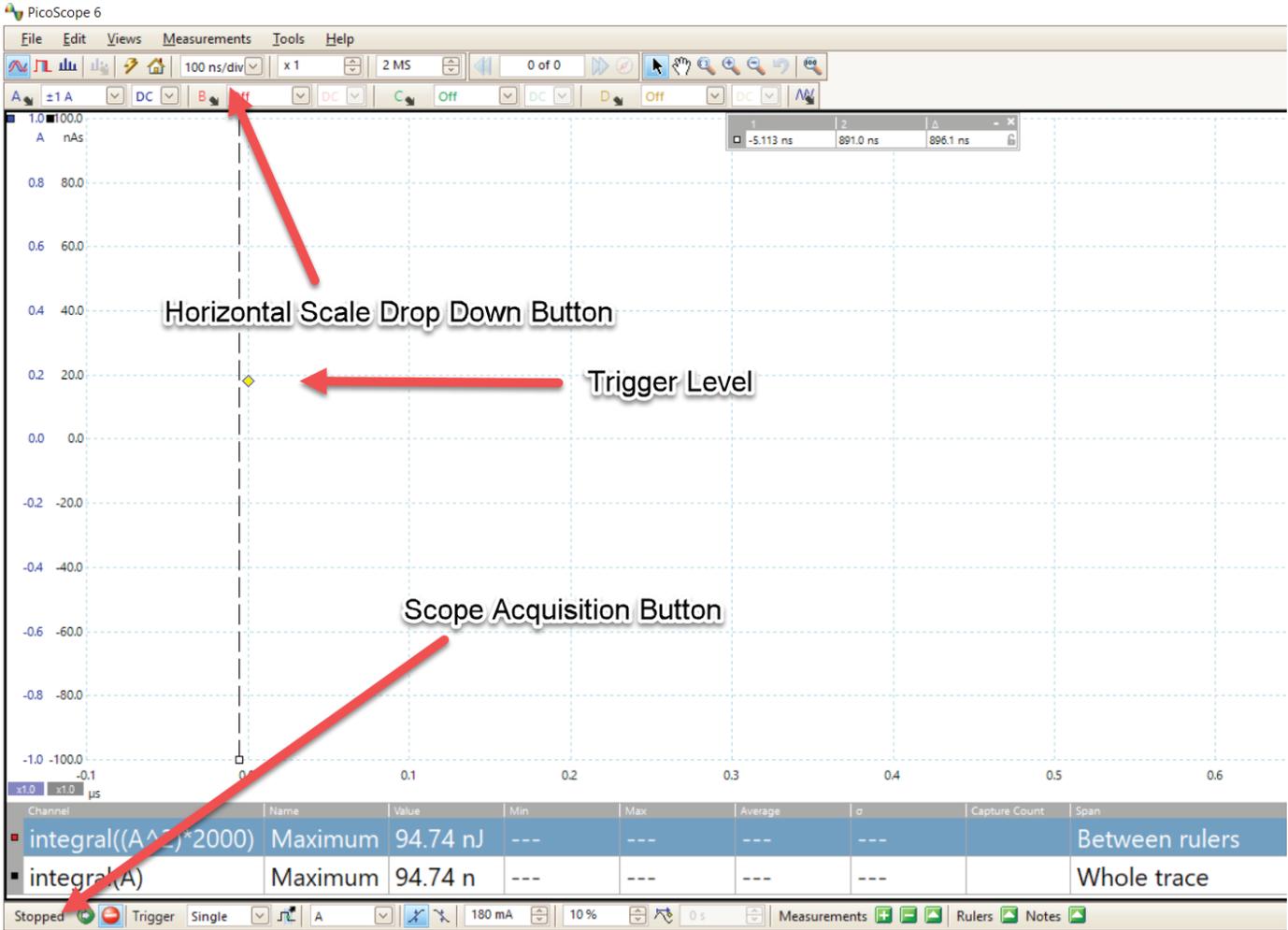


Figure 7: Screenshot of the PicoScope software with the “Waveform Verification Setup file” open.

- M. Click the “Stopped” button at the bottom left hand portion of the screen to place the scope in “acquisition” mode. The wording “Stopped” will change to “Running” (Figure 7).
- N. Initiate a discharge by pressing the red DISCHARGE button on the PDS-510. If a waveform is acquired, the “Running” will change to “Stopped”.
- O. Using the computer mouse drag the left scope cursor (vertical dotted line) to the left of the discharge waveform start and the right cursor to the point where the waveform decays to zero. The calculated energy should be 50 ± 6 μ J (microjoules) and the peak current should be greater than 420 mA (milliamps 0.42 amps). The blue line is the discharge waveform and the red line is the calculated energy curve in microjoules (Figure 8).

If the energy and/or the peak voltage are less than required, increase the voltage until the required peak voltage and energy levels are obtained. This voltage level might be in the 1030-1060 volt range.

Note: It is recommended that the discharge voltage be adjusted so that the energy is 50 ± 2 μ J. If there are no values displayed in the red circle area move the right cursor slightly and the values should appear.

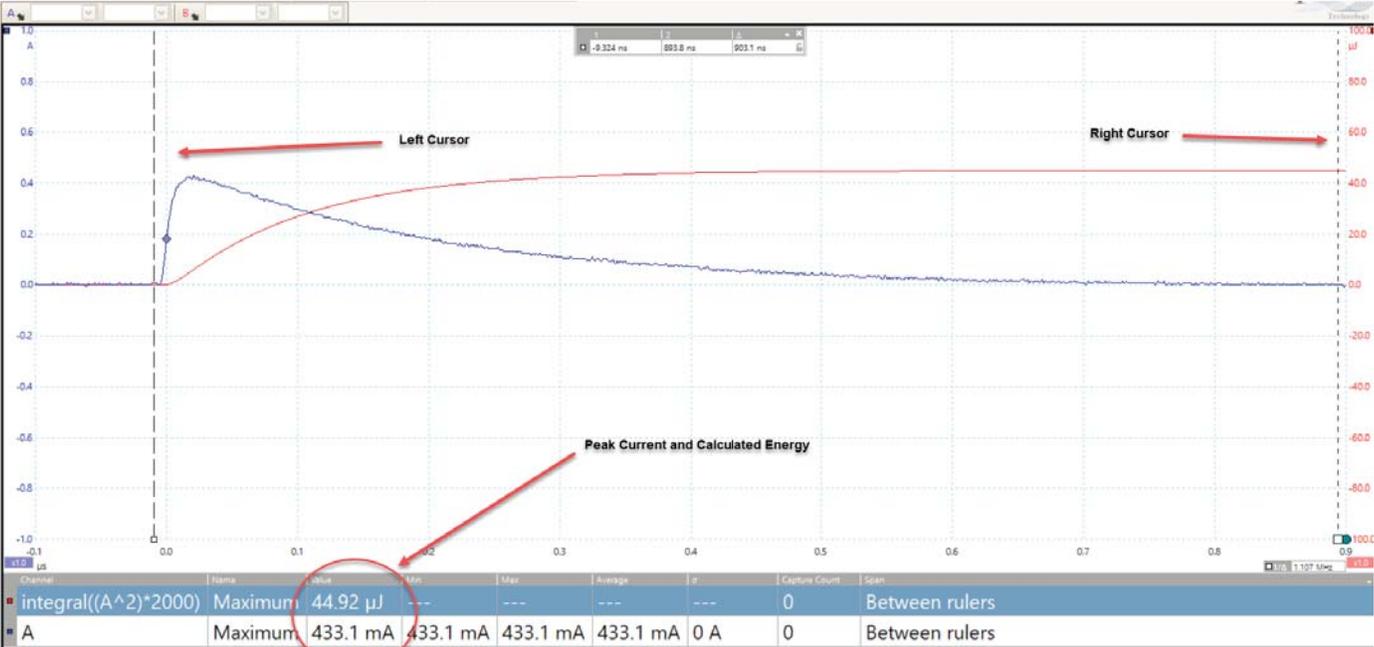


Figure 8: Screenshot of the PicoScope software measuring the energy.

VI. Shielding Bag Testing

The following test sequence describes the basic procedure as outlined in ANSI/ESD STM 11.31. The test is designed for 20x25 cm (8x10 inch) static shielding bags.

- A. From the PicoScope software, click on File > Open and select the “Shielding Bag Test File” or “Shielding Bag Test File with Manual Cursors” file from the desktop.

NOTE
If you wish the software to analyze the test automatically, use the “Shielding Bag Test File”. If you wish to analyze the data manually, select the “Shielding Bag Test File with Manual Cursors”.

- B. Lift the Discharge Arm (C) and place it into the notch of the Bracket (E) (Figure 9).



Figure 9: The Discharge Arm sitting up right

- C. Open the shielding bag to be tested and insert the Capacitive Arm (D) into the bag (Figure 10). Place the bag so the top of it lines up with the mark on the Capacitive Arm (Figure 11).



Figure 10: The Capacitive Arm inside the shielded bag.

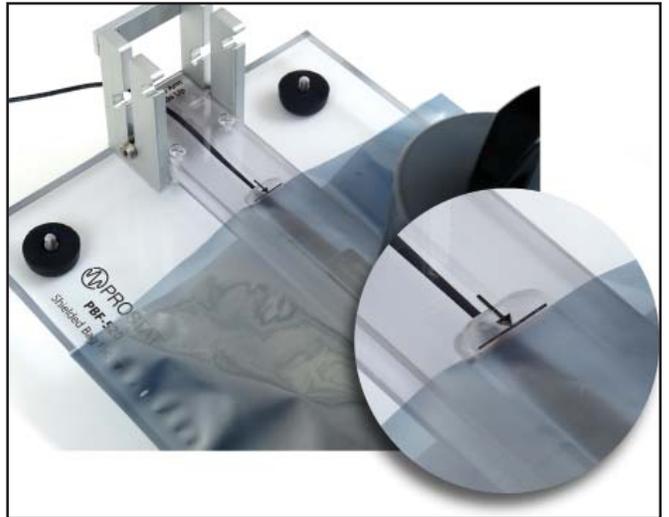
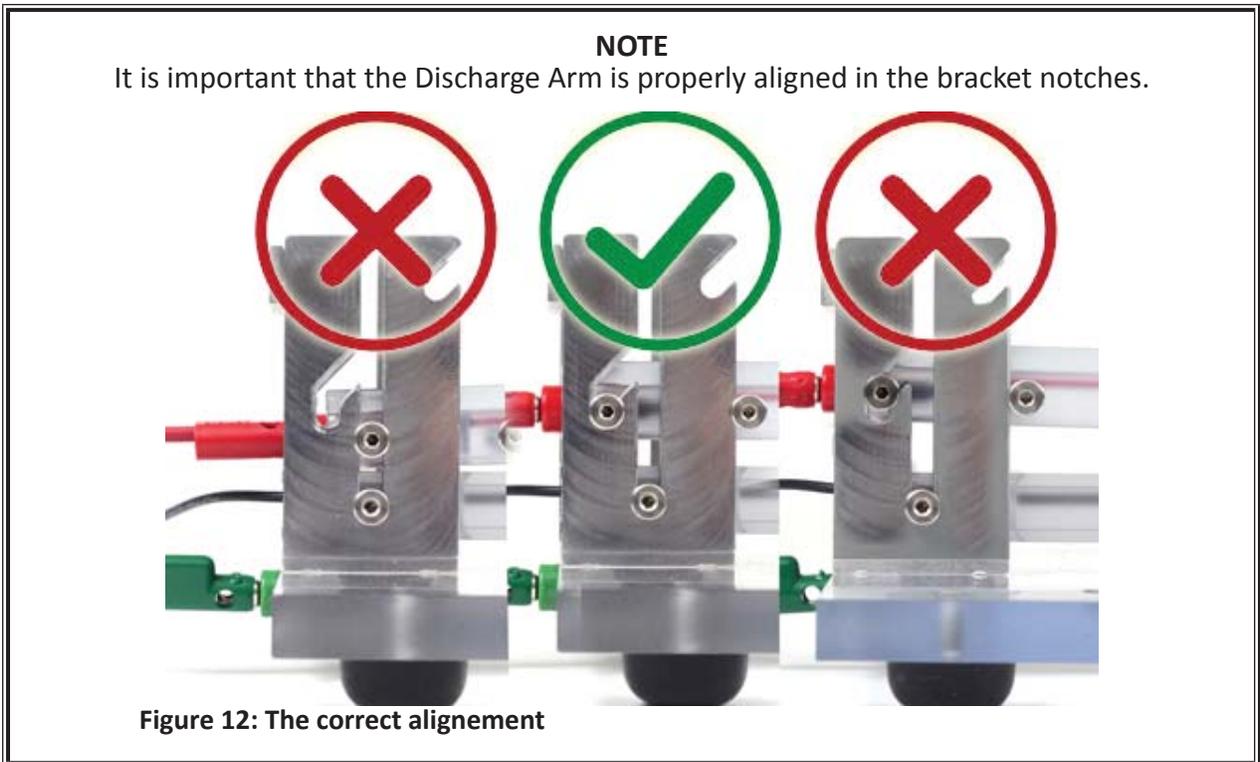


Figure 11: The end mark on the Capacitive Arm represents 10 cm (4") from the top of the shielded bag.

- D. Move the Discharge Arm so that it contacts the top of surface of the bag.



- E. Place the PRS-801-W five lbs weight onto the Discharge Arm (Figure 13).

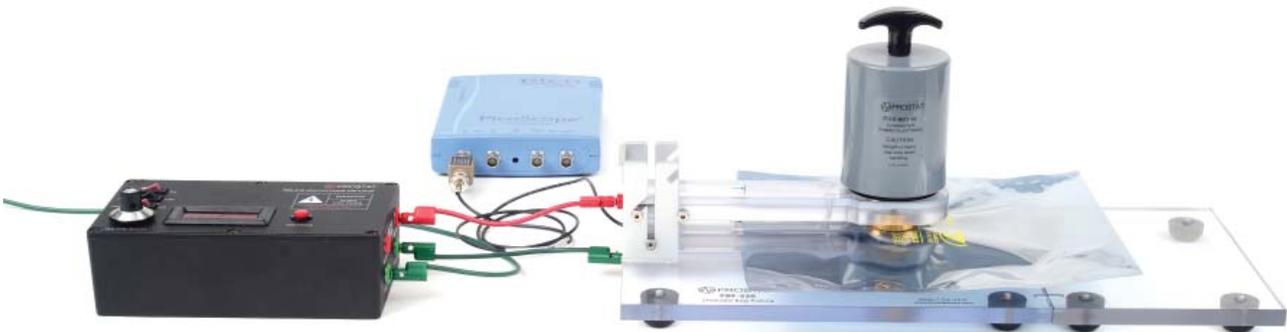


Figure 13: Complete setup for Shielded Bag Test.

- F. Set the Range to HIGH on the PDS-510.
- G. Turn the HIGH VOLTAGE to the ON position.
- H. Use the knob to set the voltage to the level established in System Verification Test.
- I. Click the “Stopped” button at the bottom left hand portion of the screen to place the scope in “acquisition” mode. The wording “Stopped” will change to “Running” (Figure 7).
- J. Initiate a discharge by pressing the red DISCHARGE button on the PDS-510.
- K. Using the mouse, drag the left scope cursor to the left of the discharge waveform and the right cursor to the point where the waveform decays to zero. *Note: If the waveform dips below the zero line place the cursor at the point where it crosses the zero line from the second time (Figure 14).*

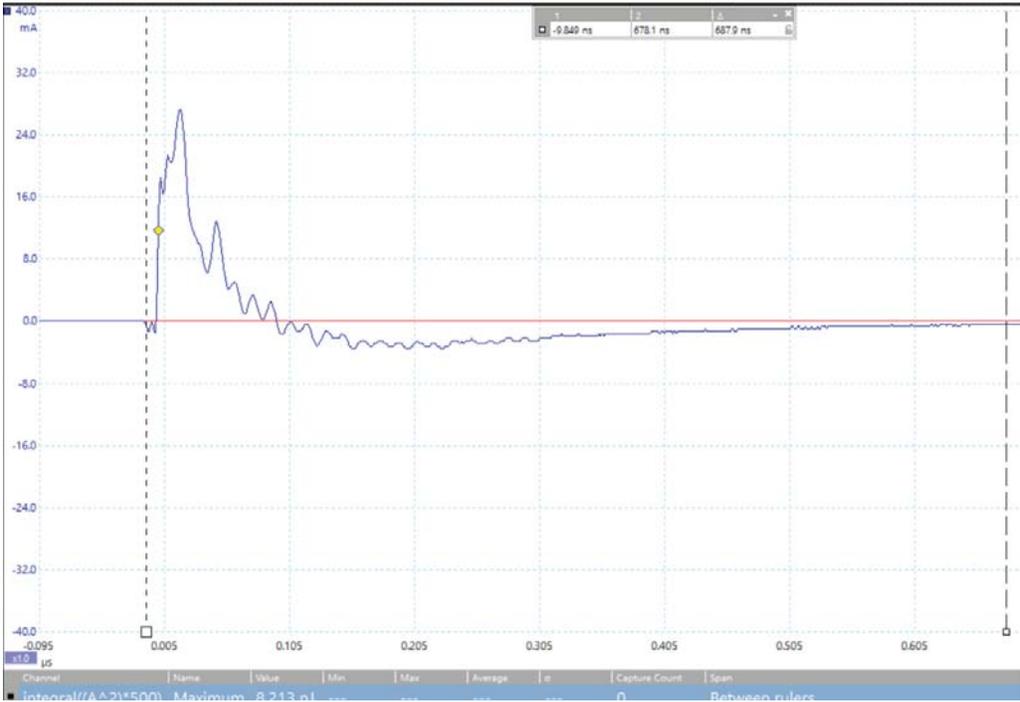


Figure 14: Screenshot of the PicoScope software measuring the energy.

- L. Record the calculated energy.
- M. Repeat the process five more times for a total of six discharges per bag.
- N. Repeat the test for five more bags.
- O. ANSI/ESD S11.31 requires that the discharge energy for static shielding bags be less than 20 nJ.

WARNING
Turn off the High Voltage when not in use.

VII. Power Supply

The PDS-510 is also equipped with a power supply that can be used to charge UNGROUNDED items from 0 to 4,000 volts. In order to use the power supply:

- A. Make sure that the PDS-510 is connected to AC ground using one of the unit's grounding ports.
- B. Connect a cable to the Power Supply output port of the PDS-510.
- C. Adjust the power supply's voltage to the desired level.
- D. Using the open end of the cable contact the cable to the item that requires charging.
- E. After charging the item of interest, turn the PDS-510 off to prevent shocks and damage to the PDS-510. Care must be exercised to prevent shocks to personnel.

VIII. Charging the Battery

The PDS-510 is supplied with a universal charger in order to charge the battery. In order for the batteries to charge, make sure the Main Power switch is ON. The batteries will not charge if the Main Power is OFF.

The charger comes with several adapters for different outlets.

IX. Frequently Asked Questions

- A. PicoScope 6 does not recognize my device:
 1. Verify that the LED light is lit on the front of the oscilloscope. There should be a red light.
 2. Check the USB cable (ensure it is the supplied Pico blue USB cable). Try a different USB port.
 3. If using a device with an external power supply, disconnect and reconnect the power supply.
 4. If using a desktop PC, consider using the rear USB ports.
 5. If using multiple USB devices on a PC and the PicoScope does not have an external power supply, consider using a powered USB hub.
 6. Device Manager – confirm that the device is listed either under Pico Technology Instruments (or Universal Serial Bus controllers for older models such as the PicoScope 2205).
 7. Confirm that the operating system is Windows XP (SP 3), Vista, 7, 8 or 10 (32 or 64-bit).
 8. Verify that the .NET framework version is 2.0 (Windows XP) or 3.5 or later by going to the Add/Remove Programs window in Control Panel and verifying which one is installed.
 9. Ensure all the latest Windows updates have been applied to the PC.
 10. Is the PC connected to the internet when installing or starting PicoScope 6?

X. Warranty

Prostat Warranty

Prostat Corporation expressly warrants that for a period of one (1) year from the date of purchase, that Prostat instruments will be free from defects in material (parts) and workmanship (labor). If PROSTAT receives notice of such defect during the warranty period, Prostat will replace at its expense such parts that it determines to be defective. Any defective part must be returned to PROSTAT postage prepaid with proof of purchase date.

Warranty Exclusions – THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean, or repair products. Limit of Liability – in no event will Prostat or any seller be responsible or liable for special, incidental, or consequential losses or damages, under any legal theory including but not limited to contract, negligence, or strict liability.

Fulfillment by Prostat of its express warranty obligations described above will be purchaser’s exclusive remedy and will be Prostat’s and seller’s limit of liability for any breach of warranty or otherwise.

PDS-510 HBM Discharge Simulator Specifications

- Discharge Output: Adjustable up to 4kV
- Power Supply Output: Adjustable up to 4kV
- Power Supply Accuracy: ±2%
- Discharge Waveform
ANSI/ESD STM11.31: Rise time @ 0Ω: <10 nsec
@ 500Ω: <20 nsec
Fall time @ 0Ω: 150±15 nsec
@ 500Ω: 200±20 nsec
Ringing: <15%
- Power: Batteries: 4 each AA 2600 mAh low self-discharge, Rechargeable, Nickel-Metal Hydride Battery

Power Supply: From 90VAC to 264VAC, 47Hz to 63Hz. UL and TUV 60950-1 approved.
- Dimensions: 7.5”L x 4.5”W x 2.5”H (19.05cm x 11.43cm x 6.35cm)
- Weight: 2.0 lbs (907g)

PBF-520 Shielded Bag Fixture Specifications

- Base Material: Flame Retardant Polycarbonate
- Surface Resistivity: >1x10¹³Ω

Discharge and Ground Electrodes"	1.5" (3.8 cm) brass, gold plated
Capacitive Probe:	0.830" (2.1 cm) brass, gold plated
Capacitance:	Nominal 8pF
High Voltage Resistor:	500 Ohms, 1% tolerance
Support Area Surrounding the Ground Electrode:	8x10" (20x25cm) - <i>without Base Extension attached</i> 8x15" (20x35cm) - <i>with Base Extension attached</i>
Dimensions:	11"L x 8"W x 4"H - <i>without Base Extension</i> 6"L x 8"W x 1"H - <i>Base Extension</i>
Weight:	3.0 lbs (48 oz) - <i>without Base Extension</i> 1.0 lbs (16 oz) - <i>Base Extension</i>

Tektronix® CT1 Current Probe - Includes Attenuator

Bandwidth:	1 GHz
Sensitivity (into 50Ω):	5mV/mA
Accuracy:	±3%
Cable Length:	40" (1 meter)

PicoScope® Oscilloscope Specifications

Bandwidth:	200 MHz
Sampling Rate:	Up to 1 GS per seconds
PC Connectivity:	USB 2.0 (USB 3.0 compatible). USB cable included
Power Requirements:	Powered from USB port
Software Included:	PicoScope 6 for Microsoft Windows 7, 8 and 10; 32-bit and 64-bit

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Prostat Corporation

630-238-8883 • Fax: 630-238-9717 • 1-855-STATIC1 • www.prostatcorp.com