

# USER MANUAL

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## SHIELDED BAG TEST KIT AND POWER SUPPLY

PBT-531      PDS-510



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# Warning! Important Safety Information

Please read the Safety Instructions before using your Meter.

Refer to the table below for an explanation of symbols which may be on your Prostat product.

In this manual, a Warning identifies conditions and actions that pose hazards to the user. A Caution identifies conditions and actions that may damage the Meter or the equipment under test.

|  |  |  |  |
|--|--|--|--|
| <b>CAUTION:</b> TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). THERE ARE NO USER SERVICEABLE PARTS INSIDE. REFER ALL SERVICING TO QUALIFIED PERSONNEL. |  |  | AC voltage: Rated voltage marked with this symbol is AC voltage.   |
|  | This symbol indicates that high voltage is present inside. It is dangerous to make any kind of contact with any internal part of this product.   |  | DC voltage: Rated voltage marked with this symbol is DC voltage.   |
|  | This symbol indicates that this product has included important literature concerning operation and maintenance.  |  | Caution. Consult instructions for use: This symbol instructs the user to consult the user manual for further safety related information. |
|  | This symbol indicates earth ground.  |  | This symbol represents capacitance.  |
|  | This symbol indicates battery safety approval.   |  | Conforms to European Union directives.   |
|  | This product contains a Lithium-ion battery that successfully passed UN 38.3 testing ensure the safety of lithium ion or lithium metal batteries during shipping.  |  |  |
|  | This product contains a Lithium-ion battery. Do not mix with solid waste stream. Spent batteries should be disposed of by a qualified recycler or hazardous materials handler per local regulations.   |  |  |
|  | This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste. |  |  |

- This apparatus uses rechargeable batteries. In your community, there might be environmental regulations that require you to dispose of batteries properly. Please contact your local authorities for disposal or recycling information.
- Never insert anything metallic into the open parts of this apparatus. This may cause a danger of electric shock.

- To avoid electric shock, never touch the inside of this apparatus. Only a qualified technician should open this apparatus.
- Do not drop or strike the product. If the product is damaged, contact a Prostat Authorized Service Center.
- This equipment is intended for use in electrostatic processes that are free from water, oil, solvent and other conductive contaminants. Exposure to such contaminants will cause failure of the electrical insulation system in the product
- This equipment may require proper grounding for accurate measurement in certain ranges.
- This equipment may get damaged if dropped. In such an event, it should be carefully examined and any necessary repairs be made by an authorized technician.
- Do not exert any pressure on the LCD display from the top.
- In rare cases cleaning the PDS-510, case and display with a slightly dampened cloth may be required. Should this be required, use a very weak solution of liquid soap and water. The cloth should be barely damp. DO NOT allow the instrument to become wet with the cleaning solution.
- DO NOT allow cleaning solution to enter the unit through apparatus openings. Should the unit become damaged with cleaning solutions, the warranty is voided.
- Do not expose this apparatus to dripping or splashing.
- Do not dispose of batteries in a fire.
- Do not short-circuit, disassemble, or overheat the batteries.

The system and meter complies with:

| Document                                | PBT-531 | PDS-510 |
|---|---------|---------|
| ANSI/ESD STM11.31 Shielded Bags         | •       |         |
| IEC 61340-4-8 Shielded Bags             | •       |         |
| MIL-PRF-81705E Packaging                | •       |         |
| ANSI/ESDA/JEDEC JS-001 Human Body Model | •       | •       |

# 01 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.

## Contents

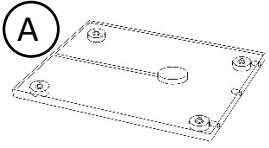
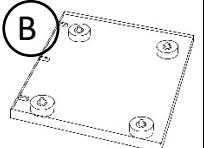
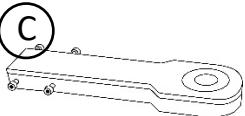
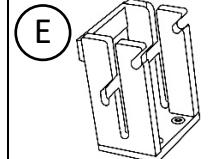
**Table 1** is a list of the items included with your product.

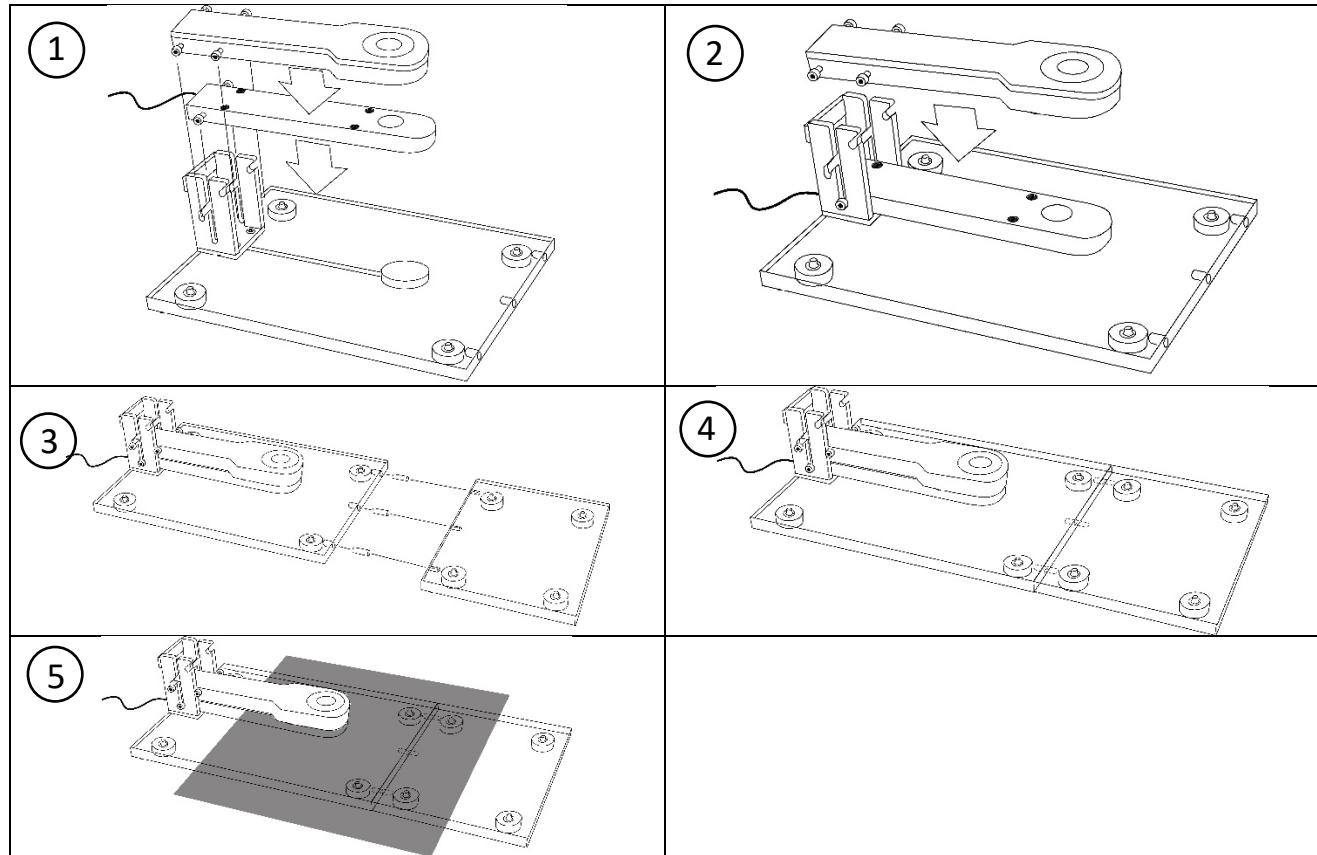
| Part No.   | Description                         | PBT-531 | PDS-510 |
|------------|-------------------------------------|---------|---------|
| PDS-510    | HBM Discharge Simulator             | •       | •       |
| PBF-520    | Shielding Bag Test Fixture          | •       |         |
| CT1        | Tektronix® CT1 Current Probe        | •       |         |
| PicoScope® | Oscilloscope from Pico Technology®  | •       |         |
| PICOTA51   | 50-ohm terminator                   | •       |         |
| PBT-531TD  | System File and System Verification | •       |         |
| PRF-911GGL | 36" Silicone Test Lead – Green      | •       | •       |
| 510-053    | 4" Lead - Green                     | •       | •       |
| 510-054    | 4" Lead - Red                       | •       | •       |
| PRS-801W   | 5 lbs Conductive Rubber Electrode   | •       |         |
| Q007B      | Common Point Ground Connector       | •       | •       |
| PBT-500C   | Hard Shell Carrying Case            | •       |         |

**Table 1. Packing List**

## 02 ASSEMBLY INSTRUCTION FOR THE PBF-520

### Assembly

|   |   |   |  |   |
|---|---|---|--|---|
|  |  |  |  |  |
| Base Assembly   | Base Extension  | Discharge Arm   | Capacitive Arm   | Bracket   |



## 03 PRE-TEST SETUP

### PBT-531 System Setup

1. Attach the supplied 510-054 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).
2. Attach the supplied 510-053 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 510-054 red lead to the HBM Output connector on the PDS-510



Figure 2. Connect the other end of the 510-054 lead to the Discharge Arm. Connect the short green lead to the base

3. Attach a second (long) 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 PRF-911GGL green lead to the the PDS-510's green output

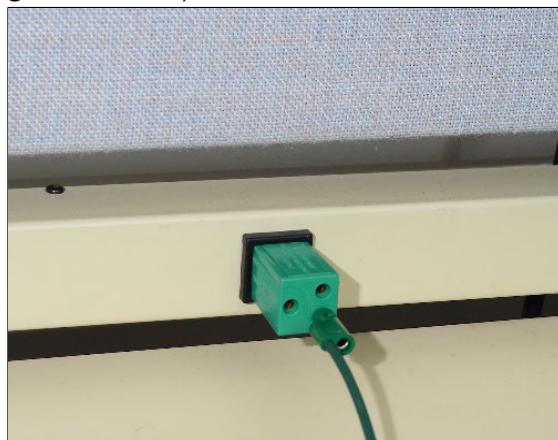


Figure 4. Connect the other end of the PRF-911GGL lead to the Q007B of an outlet

4. Connect the current probe coming from the Capacitive Arm to the male end of the **PICOTA51** 50-ohm terminator (Figure 5).
5. Connect the female end of the 50-ohm terminator to Channel A of the PicoScope® (Figure 6).
6. Connect the supplied USB cable from the PicoScope® unit to a computer.



Figure 5. The PICOTA51 50 ohm terminator connects to the Tektronix® CT1 Current Probe

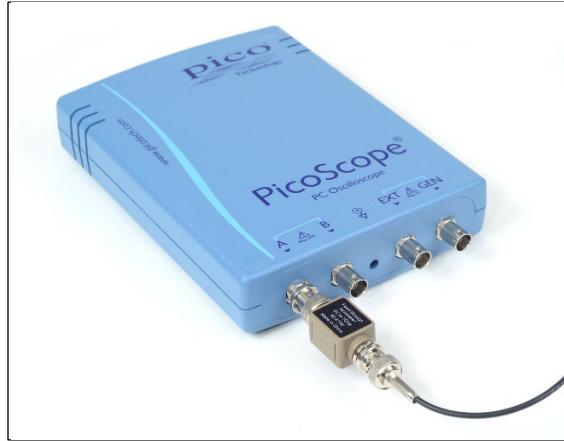


Figure 6. Connect the female end of the 50-ohm terminator to Channel A of the PicoScope®

## 04 SYSTEM VERIFICATION TEST

### Software Setup

1. 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 PicoScope®.
2. 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.
3. Launch the PicoScope® software. **Note:** It is recommended that you launch the PicoScope® software first and then open the files from the thumb drive.
4. From the PicoScope® software, click on **File > Open** and select the “**Waveform Verification Setup file**” from the desktop
5. Turn on the PDS-510 by sliding the Main Power switch to the **ON** position.

6. Switch the **POWER** to the **ON** position.
7. Switch the **RANGE** to the **HIGH** position.
8. Switch the **HIGH VOLTAGE** to the **ON** position.
9. By using the knob, adjust the voltage to 1.00 (1,000 volts).
10. In the PicoScope® software, if needed, move the yellow trigger icon above the scope's zero line (0.2A) on the left vertical scale (Figures 7 and 8).
11. Ensure that the scope horizontal scale is set to 100 ns per division (Figures 7 and 8).
12. 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.

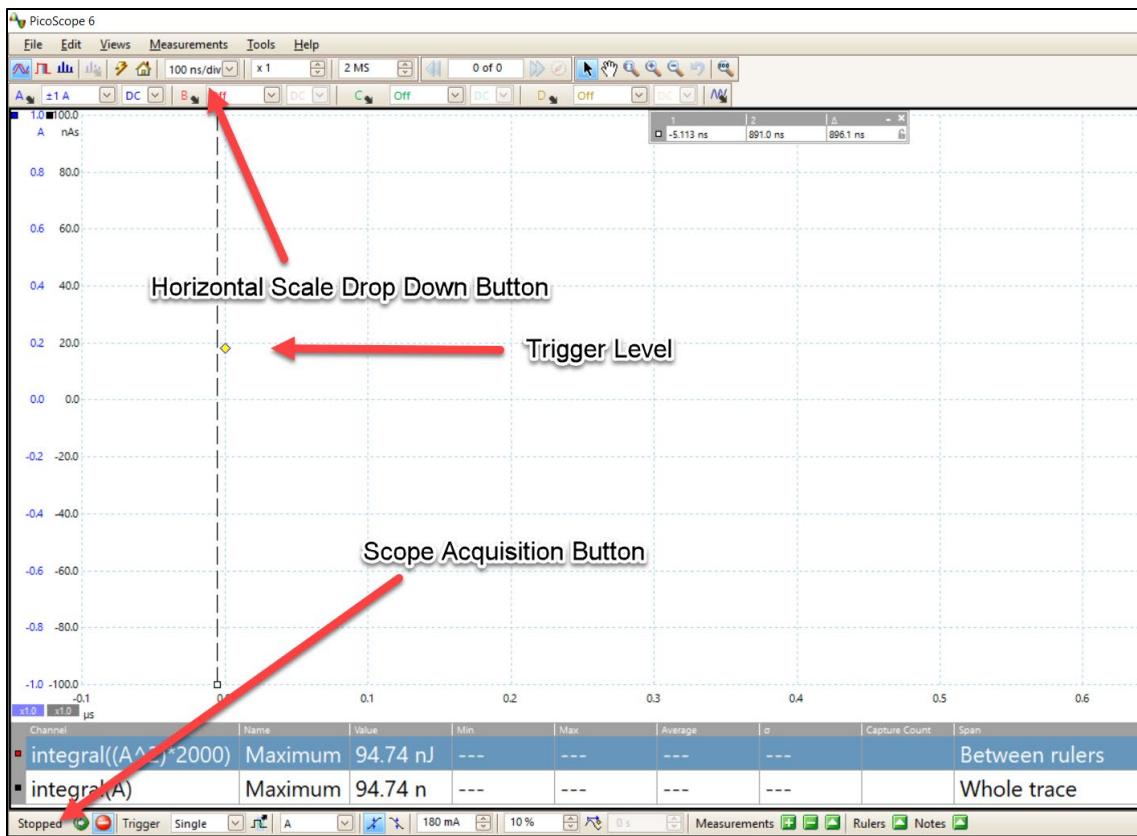


Figure 7. Screenshot of the PicoScope® 6 Software with the “Waveform Verification Setup file” open.

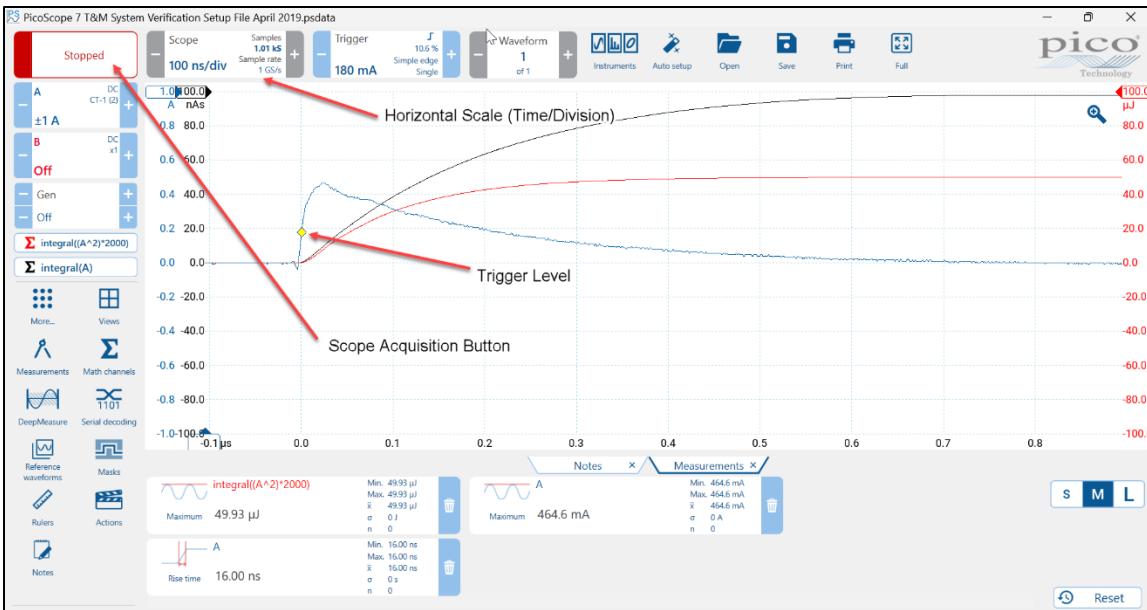


Figure 8. Screenshot of the PicoScope® 7 Software with the “Waveform Verification Setup file” open.

13. Click the “Stopped” button at the bottom left hand portion of the screen (PicoScope 6) or the top left hand portion of the screen (PicoScope 7) to place the scope in “acquisition” mode. The wording “Stopped” will change to “Running” (Figures 7 and 8).
14. Initiate a discharge by pressing the red **DISCHARGE** button on the PDS-510. If a waveform is acquired, the “Running” will change to “Stopped”.
15. 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  $50 \pm 6 \mu\text{J}$  (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 (Figures 9 and 10).

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  $50 \pm 2 \mu\text{J}$ . If there are no values displayed in the red circle area move the right cursor slightly and the values should appear.

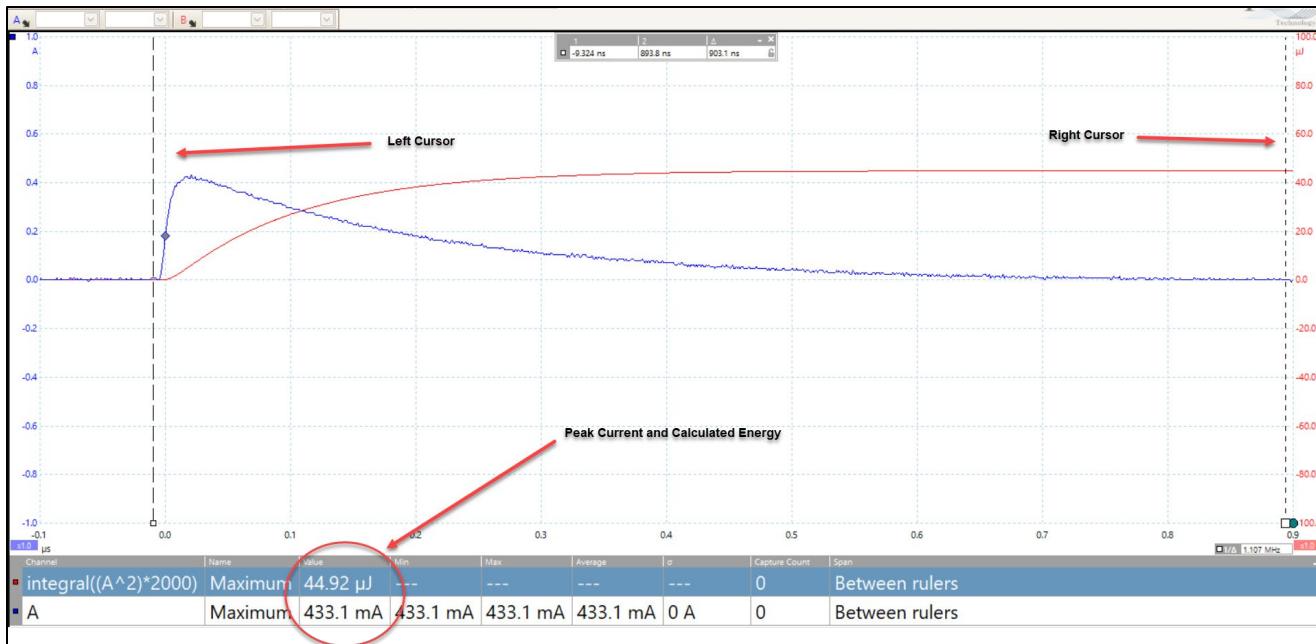


Figure 9. Screenshot of the PicoScope® 6 Software measuring the energy.

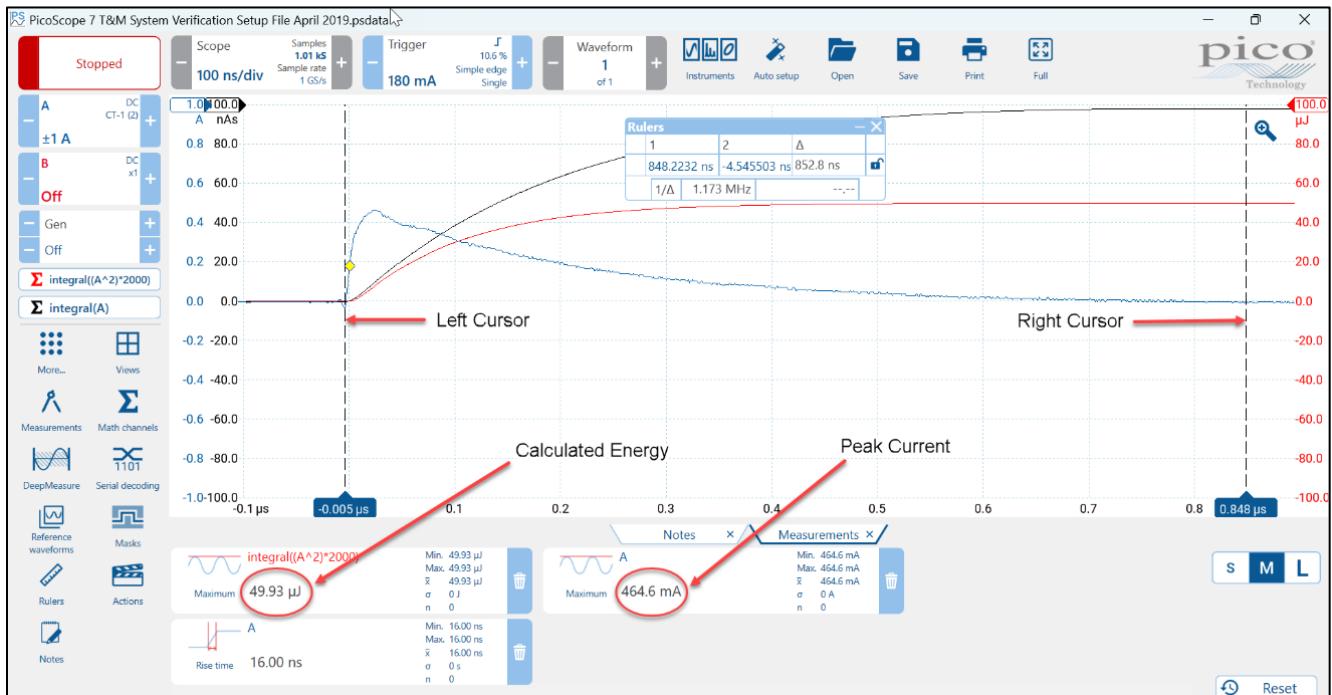


Figure 10. Screenshot of the PicoScope® 7 Software measuring the energy.

## 05 SHIELDED 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.

1. 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”.

2. Lift the **Discharge Arm (C)** and place it into the notch of the **Bracket (E)** (Figure 11).

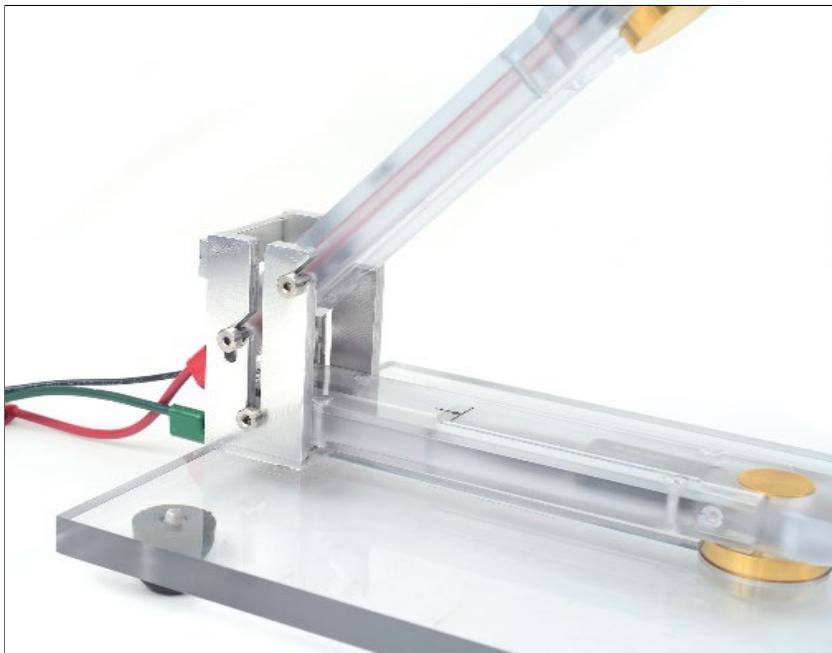


Figure 11. The Discharge Arm sitting up right

3. Open the shielding bag to be tested and insert the **Capacitive Arm (D)** into the bag (Figure 12). Place the bag so the top of it lines up with the mark on the **Capacitive Arm** (Figure 13).



Figure 12. The Capacitive Arm inside the shielded bag.

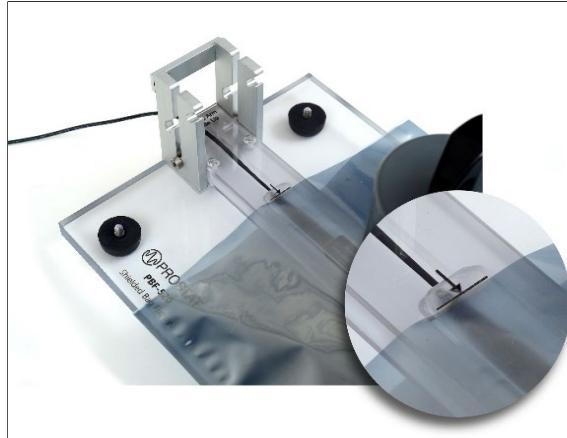


Figure 13. The end mark on the Capacitive Arm represents 10 cm (4") from the top of the shielded bag.

4. Move the **Discharge Arm** so that it contacts the top of surface of the bag.

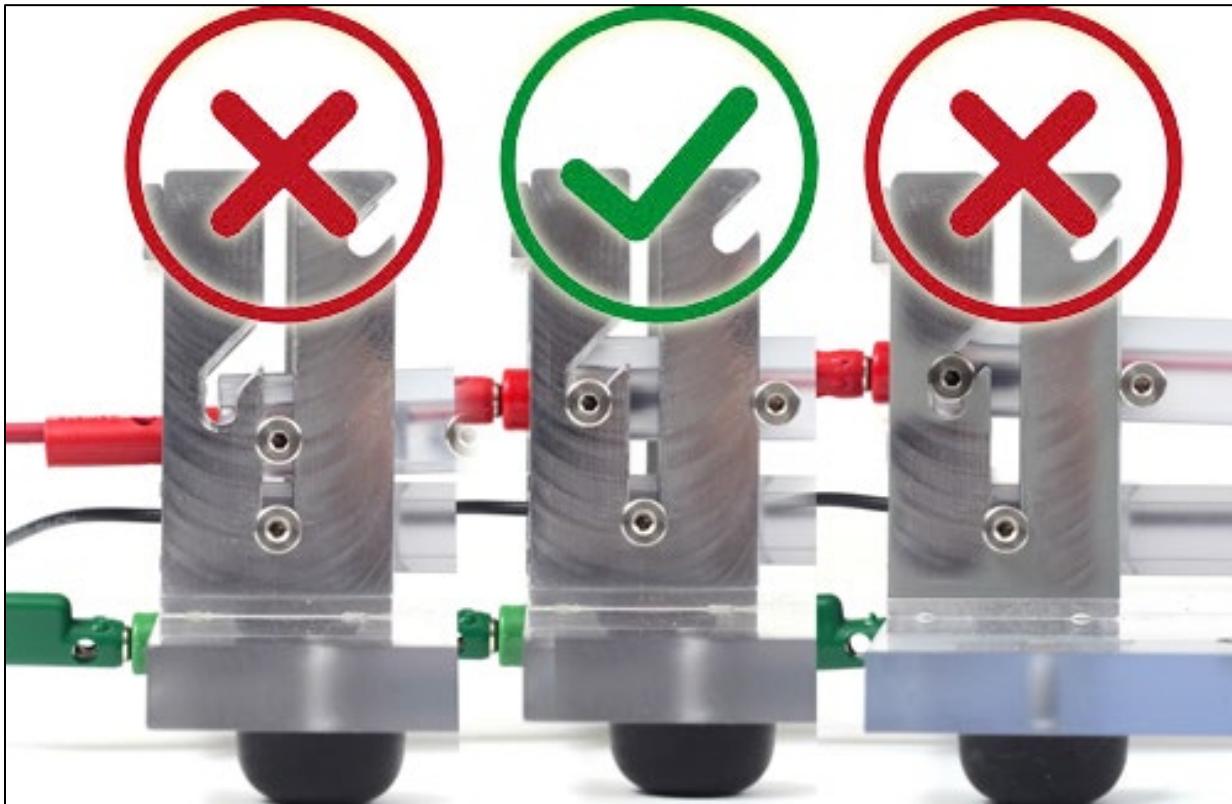


Figure 14. The correct alignment.

5. Place the PRS-801-W 5 lbs weight onto the **Discharge Arm** (Figure 15).



Figure 15. Complete setup for Shielded Bag Test.

6. Set the Range to **HIGH** on the PDS-510.
7. Turn the **HIGH VOLTAGE** to the **ON** position.
8. Use the knob to set the voltage to the level established in System Verification Test.
9. 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**" (Figures 7 and 8).
10. Initiate a discharge by pressing the red **DISCHARGE** button on the PDS-510.
11. 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 for the second time (Figures 16 and 17).

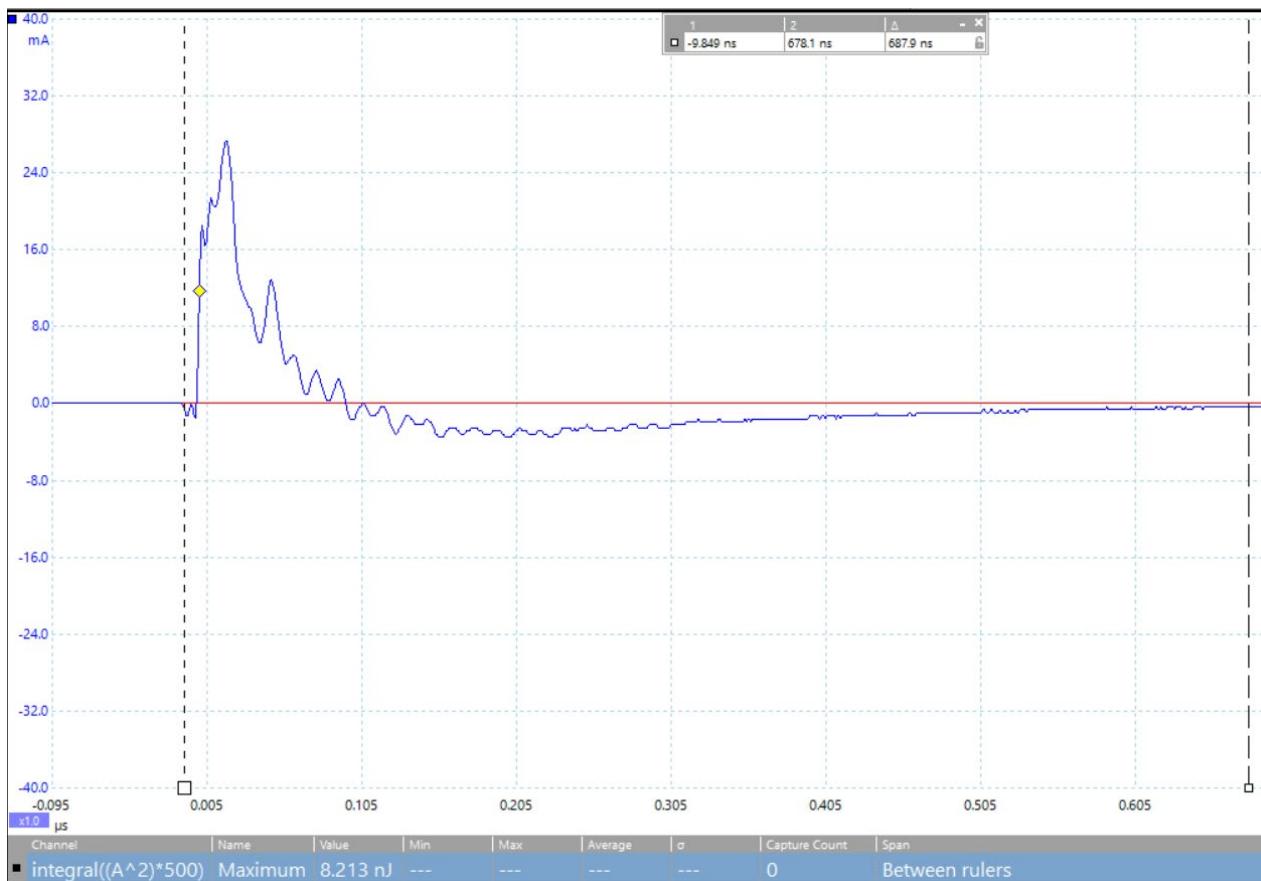


Figure 16. Screenshot of the PicoScope® 6 Software measuring the energy.

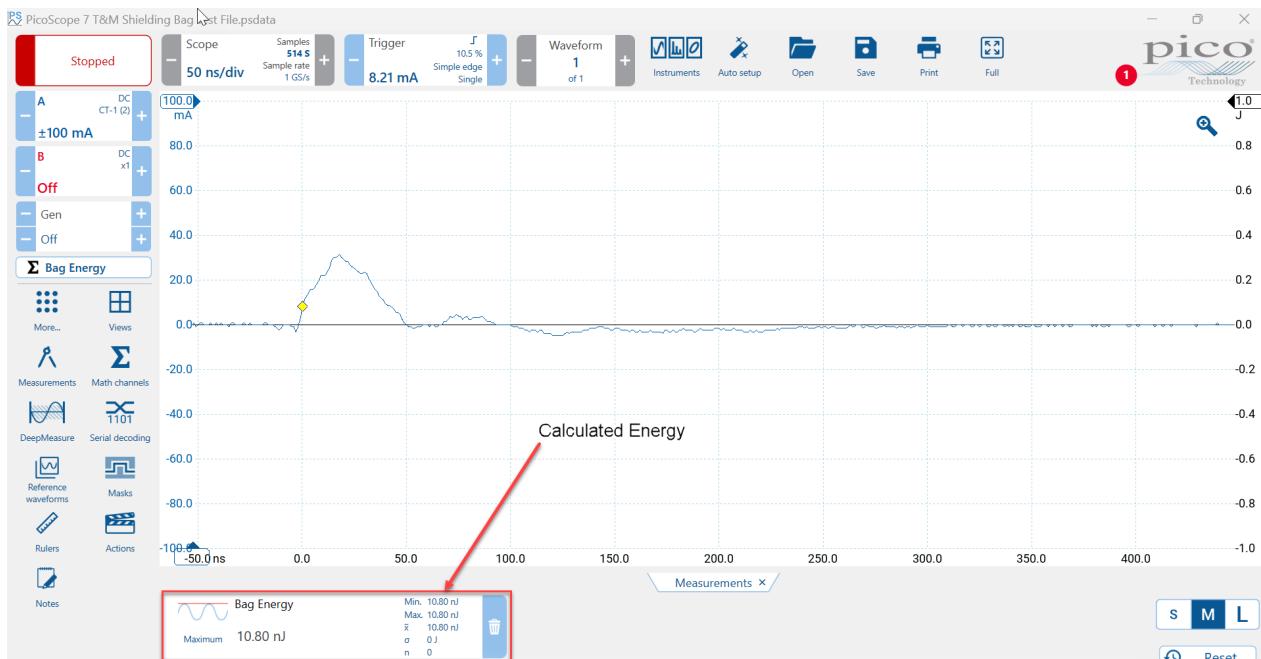


Figure 17. Screenshot of the PicoScope® 7 Software measuring the energy.

12. Record the calculated energy.
13. Repeat the process five more times for a total of six discharges per bag.
14. Repeat the test for five more bags.
15. 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.

## 06 PDS-510 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:

1. Make sure that the PDS-510 is connected to AC ground using one of the unit's grounding ports.
2. Connect a cable to the Power Supply output port of the PDS-510.
3. Adjust the power supply's voltage to the desired level.
4. Using the open end of the cable contact the cable to the item that requires charging.
5. 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.

## 07 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.

## 08 TROUBLESHOOTING

PicoScope® Software 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, 10 or 11 (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® Software?











## QUESTIONS OR COMMENTS?

| CALL                        | OR VISIT US ONLINE AT  | WRITE   |
|-----------------------------|--|---|
| 1-855-STATIC1<br>(782-8421) | <a href="http://www.prostatcorp.com/contact-us">www.prostatcorp.com/contact-us</a> | Prostat Corporation<br>399 Wall Street, Suite G<br>Glendale Heights, IL 60139 |

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