

ELECTROSTATIC FIELD METER PFM-711A

User Manual



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PROSTAT® PFM-711A ELECTROSTATIC FIELD METER

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I. Introduction

The PFM-711A is an accurate, compact electrostatic fieldmeter used for locating and measuring static charge potentials. Other types of electrostatic measurements may also be made using the PFM-711A and its accessories.

- A. The PFM-711A features **SAMPLE** and **HOLD** measurement modes that allow measurements to be made in places that would be difficult to reach or see with other instruments.
- B. Range switching is provided with the PFM-711A. In **V/inch** mode, the digital display covers the range of 0 ± 1999 volts in one volt increments. In **kV/inch** mode, it covers the range of 10 volts to 20kV in ten volt increments.
 1. An analog output jack provides a 1 volt output corresponding to 10kV, which is independent of the range selected and meter indication.
 2. The circuitry is a digital, electronic chopper design and subsequently, the instrument is useful for making electrostatic field measurements in areas where ionized air is present.
 3. For accurate, repeatable performance, the PFM-711A must be grounded during normal operations.

II. Cautions & Warnings

- A. Do not point the PFM-711A Field Meter Ranging Lights into anyone's eyes.

CAUTION

Do not point ranging lights into anyone's eyes.

- B. Do not store or use instruments in damp environments.
- C. The PFM-711A Field Meter case must be grounded for proper operation.

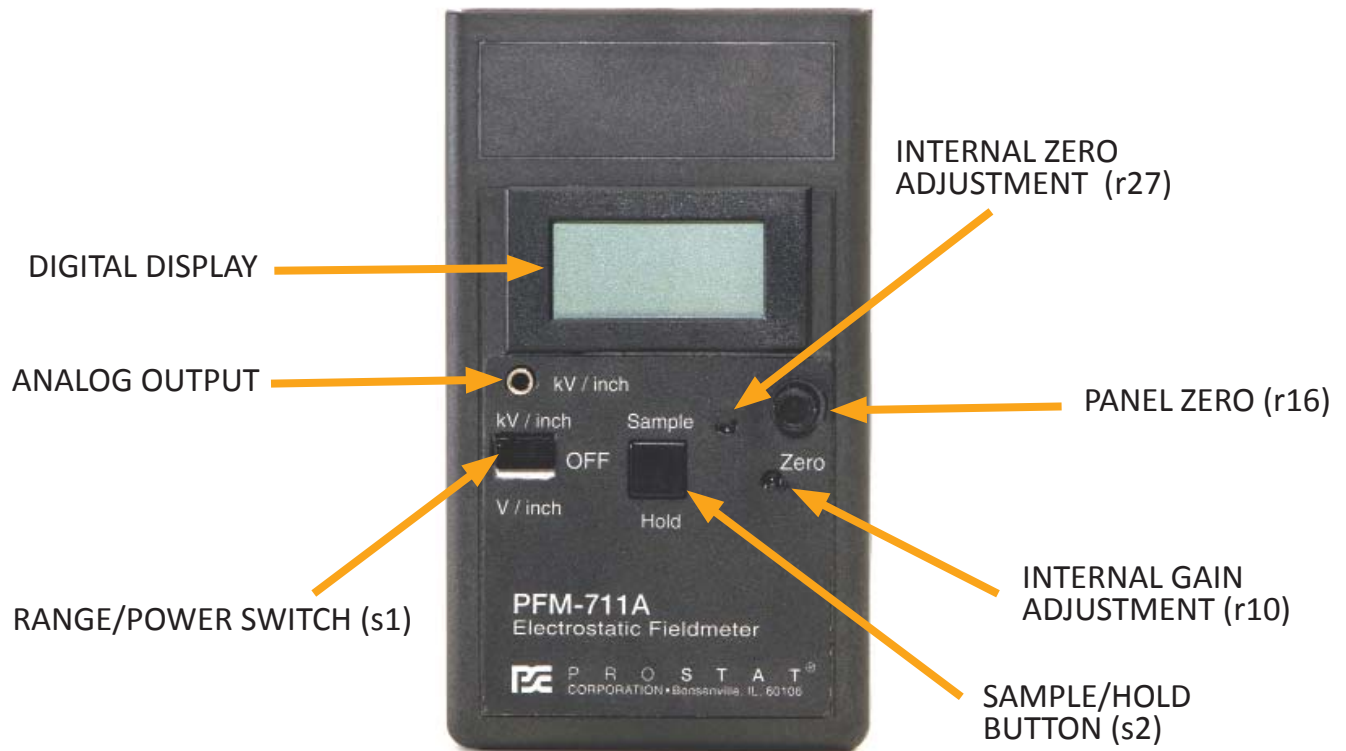
CAUTION

Ground Case of PFM-711A Field Meter for proper operation.

- D. Turn OFF all instruments when in storage or transit. Remove batteries when instruments are intended for long-term storage, i.e. six months or longer.

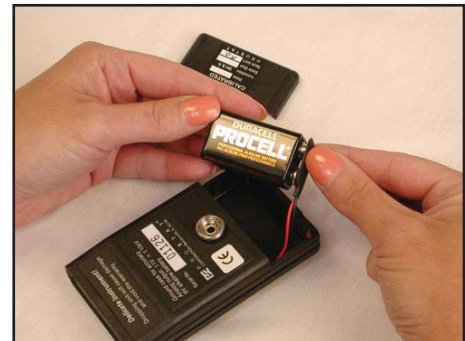
III. Equipment Inspection & Initial Preparation for use

- A. PFM-711A Field Meter – Equipment and Accessories
 - One PFM-711A Field Meter
 - One 9 Volt DC battery
 - One 36 inch analog output test cable equipped with two male banana plug



B. PFM-711A Field Meter Preparation for use

1. Install 9 Volt battery provided by sliding battery compartment open and firmly snapping battery terminals to the appropriate connectors. Battery can only be connected in one way. Carefully reclose the battery compartment.
2. Before operating, the PFM-711A, the operator should select and wear a wrist strap that is confirmed functional and properly grounded.



OPERATIONAL REQUIREMENT

Case of PFM-711A Field Meter **MUST** be grounded for proper operation.

3. With the operator's fingers contacting the grounding snap on the back of the unit, slide the three position **RANGE/POWER** Switch (s1) (**kV/inch**, **OFF**, **V/inch**) to the **kV/inch** position.
 - a. Confirm that the instrument's display is activated and that the battery low indication (**BATT**) is not displayed. If low battery is displayed, replace the battery.



- b. Cycle the **SAMPLE/HOLD** button (s2) by pushing it a few times; note the **HOLD** indication on the meter's display. Release **SAMPLE/HOLD** so that the meter is free to measure fields.
- c. Hold a flat sheet of material in front of the meter's sensing plate to confirm operation of the red ranging Bull's Eye light system. A circle with a spot in the middle should clearly appear on the material surface when held one inch from the meter's sensing plate.
- d. Point the unit away from surfaces and objects, and rotate the Black Panel (r16) **ZERO** knob until the display indicates 0.00
- e. Experiment with the meter by measuring the surface of a charged material.
- f. Slide the three way **RANGE/POWER** Switch (s1) to the **V/inch** position. Allow the display to settle to a stable indication; this should require four to eight seconds.
- g. Point the unit away from surfaces and objects, and rotate the Black Panel **ZERO** knob (r16) until the display indicates 000.
- h. Experiment with the meter by measuring the surface of a charged material.

OPERATIONAL NOTE

The case of PFM-711A Field Meter is conductive and part of the instrument's grounding circuit. If one holds the meter in one hand, and attempts to measure voltage on the other hand, no reading can be obtained regardless of body voltage.

C. Confirming PFM-711A Field Meter Analog Function.

1. Connect the analog cable to the PFM-711A **kV/inch** output jack.
2. Connect the RED output banana plug to the Positive (+) input of an X-Y plotter or digital Multi-meter (DMM).
3. Connect the BLACK output banana plug to the Negative (-) input of the X-Y plotter or Multimeter (DMM).

When the PFM-711A displays 1,000 volts, the analog should be approximately 0.1 volts.

IV. Application

The PFM-711A Field Meter is an accurate electrostatic field measuring device. Used by itself, the PFM-711A will measure electrostatic fields emanating from virtually any flat surface or object. In **V/inch** mode, the digital display covers the range of 0 ± 1999 volts in one volt increments. In **kV/inch** mode, it covers the range of 10 volts to 20kV in ten volt increments at one inch distance from the charged surface.

V. General Operation

A. Field Measurements using the PFM-711A Field Meter

1. Before operating the PFM-711A, the operator should select and wear a fully functional wrist strap that is properly grounded.

OPERATIONAL REQUIREMENT

Case of PFM-711A Field Meter **MUST** be grounded for proper operation

2. With the operator's fingers contacting the grounding snap on the back of the unit, slide the three position (**kV/inch, OFF, V/inch**) **RANGE/POWER** switch (s1) to the **kV/inch** position.
 - a. Confirm that the instrument's display is activated and that the battery low indication (**BATT**) is not displayed. If low battery indication is displayed, replace the battery.
 - b. Insure the **HOLD** feature is **OFF**. Turn the HOLD feature **OFF** by pushing the **SAMPLE/HOLD** (s2) control button once.
 - c. Hold the unit away from surfaces and objects, and rotate the Black Panel **ZERO** knob (r16) until the display indicates 0.00.



3. Position the front sensor of the PFM-711A Field Meter approximately one inch from the surface or object being measured. Move the instrument toward, or away from the surface until the RED Bulls Eye is focused on the test surface.

CAUTION

Do not shine the RED Bull's Eye Ranging lights into yours or anyone else's eyes.

4. Once the instrument is properly positioned, the PFM-711A will indicate the electrostatic field measured on its display. If desired, push the **SAMPLE/HOLD** button (s2) once to lock the indication on the display. The **HOLD** indication will also appear on the instrument display.
5. For very low voltage measurements, repeat the procedure with the PFM-711A in its low range. Slide the **RANGE/POWER** switch (s1) to **V/inch** position. Re-zero the instrument and repeat the meter positioning and measurement procedures in points 2-4, above.

6. PFM-711A Controls

The PFM-711A has two switches and a rotary knob. A three-position slide switch (s1) provides Range Selections and **ON/OFF** control. A rotary **ZERO** adjust control (r16) is also provided. The

SAMPLE/HOLD push button switch has two positions: depressing the button latches it into the lower Sample position. Pressing it again releases it into its upper **HOLD** position. The **ZERO** knob may be turned to the left or right to change the zero setting of the display. The unit must be operated while grounded.

7. Turning The PFM-711A Field Meter ON and OFF

Push the slide switch **RANGE/POWER** (s1) to its upper position (towards the display) to select **kV/inch**. The display will come ON, a decimal point will be displayed, and the meter will measure up to 19.99kV at one inch in 10 volt increments. Placing the slide switch in the lower position will select **V/inch**. There will be no decimal point in the display and the meter will measure up to 1999 volts at one inch, in one volt increments. Moving the switch to its center position will turn the meter **OFF**.

8. Zero The PFM-711A Field Meter

Ground the case by wearing a functional wrist strap that is properly grounded. Turn the meter on by selecting the desired range. Press the **SAMPLE/HOLD** button down so that it latches in the lower or **SAMPLE** position, and **HOLD** is not indicated in the meter display. Adjust the display to zero (0) volts by rotating the **ZERO** control.

IMPORTANT: The PFM-711A meter case is conductive. It provides the ground reference for its measuring circuit. For accurate measurements, it is necessary that the person holding the meter be properly grounded, or the meter has a ground connection made to the metal snap on the case.

9. Take An Electrostatic Field Measurement with the PFM711-A Field Meter

Turn the meter **ON** to the desired range. Hold the front of the meter approximately one inch from the surface to be measured. Adjust the distance from the test surface until the RED ranging lights form a Bull's Eye. Allow the instrument to stabilize. Record the Measurement.

10. HOLD A PFM-711A Measurement

With the meter in the measurement position described above, press the **SAMPLE/HOLD** button so that it latches in the upper or hold position. This will freeze the reading on the display, allowing the meter to be moved to a position where it may be more easily read and documented. When the meter is in the **HOLD** position, the word "**HOLD**" will appear in the display.

VI. Maintenance & User Adjustment

- A. The PFM-711A is factory calibrated and other than battery replacement, external cleaning, and occasional adjustment of the front panel **Zero** knob range position, general user maintenance is not required. The case has been sealed and **BREAKING THE SEALS WILL VOID THE WARRANTY**. If for any reason you believe the meter is not working correctly, contact Prostat Corporation for assistance.

USER CAUTION

Other than battery replacement & front panel zero range adjustment, there are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

1. Cleaning the PFM-711A Case & Display

Clean the meter case and display lens with a dry, soft non-scratching cloth.

- a. DO NOT USE SOLUTION TO WET THE CASE, DISPLAY OR CONTROLS.
- b. Carefully wipe the case and display until dust and dirt are removed.

USER CAUTION

In rare cases cleaning the PFM-711A, 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 control or circuit zero adjustment openings. Should the unit become damaged with cleaning solutions, the warranty is voided.

2. Adjusting PFM-711A Field Meter Front Panel Zero to Range.

The front Black panel **Zero** knob (r16) adjustment range is less than a full turn. Occasionally, it may need to be adjusted to its midpoint due to environmental temperature variations.

- a. Select the **kV/inch** range using the three position Range/Power operation switch (s1).
- b. Turn the Black Panel knob (r16) fully counter clockwise.
- c. Using a small blade screwdriver, adjust the Internal calibration adjustment (r27) (located next to **Zero** Knob) until the display reads “-1.60 kV/inch”.
- d. Rotate the Black Panel **Zero** Knob (r16) fully clockwise. The display should indicate approximately +1.60 (+/-0.10) kV/inch.
- e. Rotate the Black Panel **Zero** Knob (r16) to mid position, approximately ½ turn, until the display indicates 0.00.
- f. This completes the Black Panel **Zero** Knob (r16) adjustment

Specifications for the PFM-711A Electrostatic Field Meter

Overall Range	High Range 0 V to ± 19.99 kV (at 1" distance): Least significant digit indicates volts at one inch (kV/in) in 10 Volt increments Low Range 0 V to $\pm 1,999$ V (at 1" distance): Least significant digit indicates volts at one inch (V/in) in 1 Volt increments. Measures higher voltages at greater distances, e.g., at 2" double indicated voltage, at 4" multiply indicated voltage by four.
Instrument Tolerance	$\pm 5\%$ from 0 V to 10 kV Tolerance at > 10 kV depends on conditions and handling Accuracy unaffected by the presence of air ionization. Note: Performance when mounted in laboratory fixture positioned 1 inch from a 6"x6" reference plate
Range Lights	Red "Bulls Eye" at 1" distance
Meter Display	3½ digit Liquid Crystal Display with 0.4" digit height. Automatic polarity, HOLD and LOW BATTERY indicators
Response	Digital display updates three (3) times per second. Analog Output Time Constant: Either Range 0.1 sec. Display Time Constants: High Range 0.2 sec. Low Range 2.0 sec.
Output	Analog signal output and 30" two conductor cable provided. ± 10.0 kV meter reading equals ± 1.0 Volt output
Controls	Three position slide switch: KV/INCH - OFF - V/INCH Sample/HOLD push button, and ZERO adjust knob
Grounding	Meter circuit grounded through the conductive case and 10 mm snap fastener mounted on back of case
Power	9 Volts alkaline battery. Battery life minimum 40 hours
Dimension (LxWxH)	2.4" x 4.2" x 0.9" (6.1 cm x 10.7 cm x 2.3cm) 1.3" deep with zero knob and snap fastener (3.3 cm)
Weight	5 oz with battery installed (142g)

Specifications are subject to change without notice.
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