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INSTRUCTIONS
Operation/Maintenance

FMX-003 Electrostatic Fieldmeter



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IMPORTANT

SIMCO recommends that these instructions be read completely before installation or operation of this equipment. Failure to do so could result in personal injury and/or damage to the equipment.

Products contained in this manual are covered by one or more of the following U.S. patents: 3,892,614; 4,092,543; 4,188,530; 4,216,518; 4,423,462; 4,529,940; 4,665,462; 4,716,371; 4,734,580; 4,774,472; 4,872,083; 4,860,159; 5,017,876; 5,153,811, 5,008,594, 4,836,044 and corresponding foreign patents. U.S. and foreign patents pending.

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Fault	Possible Causes	Solution
Indicated voltage is low or plate insulation resistance is less than the recommended value.	Adhesion to dirt or condensation on the ion balance plate.	<p>Ultrasonically clean the plate insulation then dry thoroughly.</p> <p>If the above step does not improve performance, and contact your local representative or SIMCO Customer Service for read adjustment, repair or replacement.</p>

SECTION 9 Warranty

SIMCO warrants its products to be free of defects in components, workmanship, or materials for a period of one year from the date of purchase. This warranty does not apply to any physical or electrical damage done to the product through misuse or abuse or negligence (such as any modifications made to the unit or service work done by any other than SIMCO authorized technicians). Any unit that has had its serial number altered or removed will be ineligible for warranty.

All products returned must have an "RA" (Return Authorization) number regardless of warranty status. Call SIMCO for an assigned number.

SIMCO will not be liable for loss or damage due directly or indirectly to an occurrence or use for which the product is not designed or intended. In no event shall SIMCO be liable for incidental or consequential damages except where state laws override.

This warranty extends to the original purchaser and is not transferable. No person, agent, distributor, dealer or company is authorized to change, modify, or amend the terms of this warranty in any manner whatsoever.

Information in this document is subject to change without notice and does not represent a commitment on the part of SIMCO. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose other than the purchaser's personal use without written permission of SIMCO.

6. To maintain the high insulation level of insulation of the plate, the FMX-003 should be stored in a place having less than 60 %RH. It should be kept inside a plastic zipper bag with desiccant.
7. This fieldmeter is not an explosion-proof product. Do not use this product in flammable atmosphere such as paint-thinner, benzene, gasoline, propane, natural gas etc.
8. The instrument should be re-calibrated once a year. Contact SIMCO Customer Service when a recalibration of the fieldmeter is necessary.

SECTION 8 Troubleshooting Guide

Fault	Possible Causes	Solution
Fieldmeter is on but when turned toward a charges object, the number and the bar graph do not change.	The meter is in HOLD mode of operation.	Cancel the HOLD mode by pressing the HOLD button once.
The display cannot be set to zero.	The meter is in HOLD mode. The true ZERO point has shifter.	Cancel the HOLD mode by pressing the HOLD button once. If the meter reads 0.20 or more for an uncharged object, a read adjustment may be needed. Contact your local representative or SIMCO Customer Service for read adjustment, repair or replacement.
When the POWER button is pressed, LCD display does not appear.	No battery, low battery capacity or bad contact. Malfunction of the LCD display.	Replace the battery/Make proper connection. Discontinue use and contact your local representative or SIMCO Customer Service for read adjustment, repair or replacement.
A part of the LCD display does not appear. Display shows ERROR. Alarm does not sound.	Malfunction of the LCD display.	Discontinue use and contact your local representative or SIMCO Customer Service for read adjustment, repair or replacement.

SECTION 1 Safety Instructions / Safety Information

- **DANGER** indicates an immediately hazardous situation which, if not avoided, will result in death or serious injury.
- **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, will result in property damage.
- **NOTE** indicates precautions necessary to avoid potential equipment failure.

Safety Instructions

This equipment must be installed and maintained as outlined in this manual.

This equipment is not constructed for classified (hazardous) environments. It cannot be used where it will be exposed to ignitable or corrosive materials.

The FMX-003 is intended for use in areas that are free of water, oil, solvents and other conductive contaminants. Exposure to such contaminants will cause failure of the electrical insulation system in the product. Formulation of dew on the fieldmeter must be avoided.

Do not operate near corrosive fumes of acid/alkali or corrosive gases such as chlorine.

The FMX-003 must be properly grounded to function accurately.

The FMX-003 contains a sensor that is sensitive to mechanical vibrations and shock and is likely to become damaged if dropped. In such event, it should be carefully examined and any necessary repairs be made by an authorized technician.

The FMX-003 contains a microcomputer chip. It should not be used in an environment with excessive electromagnetic noise.

The internal parts of the FMX-003 should never come in contact with foreign substances.

Suspend measurement when the voltage reading is outside the measuring range. If the range is exceeded, there is a possibility of damaging the sensor.

It is possible to use this product in ionized air. However, the specified accuracy of within 10% cannot be guaranteed.

When not in use, switch off the fieldmeter to extend battery and equipment life.

Do not press on the LCD display.

The FMX-003 has been calibrated for a measuring distance of 1"± 1/64" (25mm ±0.5mm).

SECTION 2 Introduction

SIMCO FMX-003 fieldmeter is a compact electrostatic fieldmeter used for locating and measuring static charges. Its pocket size makes it handy to use and three-button operation makes it easy to operate.

The FMX-003 measures static voltages within $\pm 20\text{kV}$ (20,000V) at a distance of 1". Results are simultaneously displayed numerically and in bar graph format. POWER on/off, ZERO adjustment, Ion Balance (IB) and HOLD are all push button operation. The HOLD button allows the display to retain the static charge reading. This is especially useful where display is difficult to see during measurement.

Two LED guide ring lights help position the fieldmeter at the right distance from a charged test object. The conductive case and ground snap facilitate grounding for accurate measurement. The circuitry of the FMX-003 has been designed to make measurements in areas using air ionization.

The FMX-003 features:

- Easy to read, easy to use operations
- Lightweight, compact design
- Range light assures accurate and repeatable measurements
- Automatic range switching up to $\pm 20\text{kV}$ (20,000V) at 1" (25mm)
- Digital and bar graph display
- Automatic power off after five minutes (may be disabled if preferred)

Receipt of Equipment

1. Carefully remove the equipment from the carton.
2. Inspect contents for damage that may have occurred during shipment. If any damage has occurred during shipment, the local carrier should be notified at once. A report should be forwarded to SIMCO, 2257 North Penn Road, Hatfield PA 19440, and (215) 822-2171.
3. Empty the carton to insure that small parts are not discarded.

Return Shipments

Prior to returning goods, contact a SIMCO Customer Service representative for a Return Authorization Number. This number should be included on the packing list. All correspondence should also reference the Return Authorization Number. Any item being returned should be shipped prepaid and packed to provide adequate protection.

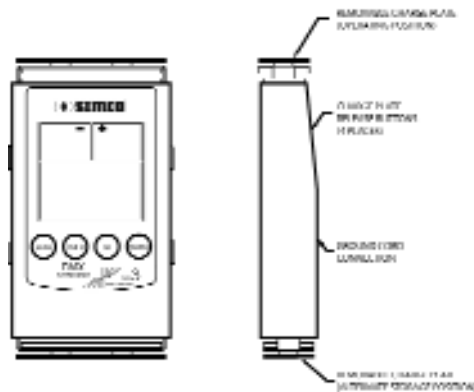


Figure 1

NOTE: Ion Balance plate must not move during measurement.

3. The conductive case must be grounded using the supplied grounding lead. It is imperative for accurate ion balance and to drain any charge that has developed prior to measurement.
4. To turn on the ion balance measuring circuit, press the blue IB button.
5. Turn sensor toward an uncharged area.
6. The meter reading should be zero (0). Press the Zero button if it is not.
7. Hold the fieldmeter centered in front of the ionizer at any convenient, repeatable distance, such as 1 foot.
8. A bar graph and a digital display on the FMX-003 displays the ion balance information. Press **HOLD** if you want to hold the display of the measured charge.
9. To turn off the meter:

Press **POWER** if you have not used the **HOLD** mode.

If you have pressed **HOLD** and wish to retain the meter reading for the next use, press the **POWER** button to turn off the FMX-003.

If you have pressed **HOLD** and do not wish to retain the meter reading for next use, press **HOLD** then **POWER**.

10. Depress the charge plate release buttons on either side of the fieldmeter to remove the charge plate. Store the plate on the opposite end but [pressing it until it clicks into place.

If the FMX-003 is left on for five minutes, the unit will beep five times then turn itself off automatically. This feature can be disabled (refer to Section 5)

SECTION 7 Important Notes and Cautions

1. Store and use the fieldmeter in a clean and dry environment. Foreign substances should never enter or touch the internal parts.
2. Vibration and impact may damage and/or affect the sensitivity of measurement of the instrument.
3. Do not attempt to take apart the fieldmeter.
4. The measuring distance between the fieldmeter and a test object should be 1" $\pm 1/64$ " (25mm ± 1 mm). The calibration was carried out at this distance. The specified accuracy is valid for this distance.
5. Grounding of the instrument is essential for sensitive ion balance measurements.

NOTE: When taking a measurement 3" from the surface, multiply the result by 2. When taking a measurement 6" away from the surface, multiply the result by 3.

5. A bar graph and a digital display on the FMX-003 displays the voltage of the charge. Press **HOLD** if you want to hold the display of the measured charge.
6. To turn off meter:
Press **POWER** if you have not used the **HOLD** mode.

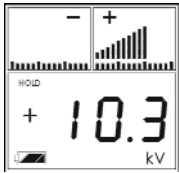


Figure 3

If you have pressed **HOLD** and wish to retain the meter reading for the next use, press the **POWER** button to turn off the FMX-003.

If you have pressed **HOLD** and do not wish to retain the meter reading for next use, press **HOLD** then **POWER**.

If the FMX-003 is left on for five minutes, the unit will beep five times then turn itself off automatically. To disable this feature, simply press and hold the red power button for at least three seconds when turning the FMX-003 on. Three beeps and the A-OFF display indicates that the feature has been disabled.

Results

A display of [+] or [-] next to the digital numeric value represents the polarity of the static electricity being measured. In addition, the color of the bars in the bar graph indicates the polarity of the static charge. Red and blue bars indicate positive and negative charges respectively.

During a static voltage measurement, if the digital display starts flashing along with a continuous beep, stop taking the measurement. The static charge is greater than the meter can measure. Attempts to measure too high a charge may damage the sensor.

SECTION 6 Operation of Ion Balance Measurement

NOTE: The FMX-003 Ion Balance measurement feature should not be used to measure the ion balance of static bars. It may be used to measure other static control devices for ion balance and to check for residual charges on surfaces.

The FMX-003 can also be used to measure ion balance voltage (residual voltage).

1. Depress the charge plate release button on either side of the fieldmeter to remove the charge plate assembly.
2. Insert the plate assembly into the other end of the fieldmeter (the end with the SIMCO logo) until it clicks into place.

SECTION 3 Specifications

Measuring range: 0 to ± 1.49 kV (Lo range)
 ± 1.0 kV to ± 20.0 kV (Hi range)
 (Range hysteresis: ± 1.0 kV to ± 1.5 kV)
 0 to ± 200 V (Ion Balance measuring range)

Measuring distance: $1" \pm 1/64"$ (25mm ± 0.5 mm); LEDs guide for correct distance (between charged object and fieldmeter)

Response time: <1 s

LCD display renewal rate: 5 times/s

Accuracy: **20KV** ± 10 %

Ambient conditions: 50°-100°F, (10° - 40°C); 0 - 60 %RH (non-condensing)

Display features: Bar graph; red LCD positive polarity voltage, blue LCD negative polarity voltage

Bar graph precision: ± 0.1 kV for low range ± 1.5 kV for high (Hi) range; ± 15 V for ion balance range

Digital reading: Auto-ranging, three digits
 . = 0 to ± 1.49 kV
 . = ± 1.0 kV to ± 20.0 kV (Hi)
 = 0 to 200 (Ion Balance)

Ion Balance mode display: [IB] is displayed

Battery capacity display indicator

HOLD switch to retain display after measurement

Error sign [Error] appears if the sensor is damaged

Alarm feature: Beep sound will be heard during the following actions:

Power on: one beep

Power on with Auto Off feature disabled: [Depress power button for more than 3 seconds] three beeps

Auto power-off: short beeps at 1 second interval for 5 seconds before power off

Over range: Continuous sound

Auto power-off: Power turns off automatically after five minutes. [A.OFF] is displayed whenever this feature is disabled.

Power source: 9 V, 6F22Y manganese battery.

Battery life: In excess of 30 hours.
Size: 4 7/8" (123mm) (L) × 2 7/8" (73mm) (W) × 1" (25mm)(D)
Weight: 6 oz. (170g)
Case material: Conductive resin (ABS)

SECTION 4 Preparation and Battery Replacement

Preparation

1. Peel off the protective plastic sheet from the display panel.

NOTE: Peeling the plastic sheet leaves the panel charged with static electricity. Neutralize the area with a static neutralizer or by wiping it with a cloth, moistened lightly with alcohol.

Battery Replacement

FMX-003 uses 9 V, 6F22Y Manganese battery. The life of the battery is about 30 hours. When the **POWER** switch is on, a battery capacity indicator displays the state of the battery on the front panel. Figure 2 shows the residual battery capacity as displayed.



Figure 2

NOTE: The dark area in the battery indicator display is not proportional to the remaining energy.

Replacement Procedure

The battery compartment on the back side of the fieldmeter has a removable cover marked **OPEN**.

NOTE: Be careful while connecting or disconnecting the battery. To avoid breaking the contacts, do not pull the connection plug hard.

1. Press down on **OPEN** and slide the cover down.
2. Remove the old battery (if present).
3. Connect the new battery and insert it into the battery compartment.
4. Reattach the cover back to the battery compartment.

NOTE: Before closing the cover, make sure that no parts of the leads are outside the battery compartment.

SECTION 5 Operation

The FMX-003 has four push buttons. The buttons operate by pressing once lightly. There is no need to press the button repeatedly. Its effective life may be decreased by repeated misuse.

The **POWER** button is red and turns the fieldmeter on and off. If the FMX-003 is left on for 5 minutes, it will automatically turn itself off. To resume operations, press the red **POWER** button once. To disable the AutoOff feature and allow continuous operation, press the red Power button and hold down for at least 3 seconds when turning the fieldmeter on.

The **HOLD** button is green and holds the display of a measured charge. **HOLD** mode turns off the focusing LEDs. No measurements are possible when in the **HOLD** mode. The hold measurement feature enables the user to use the meter in inaccessible areas. When the green **HOLD** button is pressed once during a measurement, the digital numerical value and the bar graph will be held on the display. This function allows the operator to move the meter where it can be more easily read. The **HOLD** mode is displayed above the battery capacity display. To cancel **HOLD** mode and resume measurement, press **HOLD** once more.

The **IB** button is blue and prepares the fieldmeter for Ion Balance measurement. Refer to Section 6 for details.

The **ZERO** button is gray and sets the meter to a zero charge. When the digital meter is turned on, the zero adjustment is inoperative if it is in **HOLD** mode or the meter reads more than ± 0.20 .

NOTE: For reliable measurement, the fieldmeter must be grounded properly using the ground lead provided. The plastic case of the FMX-003 Electrostatic Fieldmeter is made of conductive resin. The grounding terminal provides the reference potential for the electrical circuit. This terminal must be grounded properly for accurate measurement.

Operations

1. Turn the focusing LED and sensor toward an uncharged area.
2. Press the **POWER** button. A single beep for one second indicates proper operation. The battery capacity indicator and bar graph will be displayed.
3. The meter reading should be zero (0). Use the **ZERO** button if it is not.
4. Hold the fieldmeter 1" away from the charged surface. Two beams of light will form concentric circles when the meter is the correct distance, 1" away, from the surface.