

*Simco-Ion Handy Digital Electrostatic Fieldmeter  
Model FMX-004*

**INSTRUCTIONS**  
**Installation/Operation/Maintenance**

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**⚠ CAUTION**

It is important that these instructions be read and understood before attempting to install or operate the equipment. Failure to do so could result in serious personal injury and/or damage to the equipment. At the end of this manual, a written warranty is provided. This should be preserved carefully.

# NOTES TO USERS

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## **WARNING**

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

## **CAUTION**

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. Special care should be taken to ensure that there is no dew formation. This equipment should be stored or used in a place having less than 60 %RH. Do not insert any object in the opening for the sensor located at the measuring side of the instrument; no foreign substance should ever enter into the sensor opening.

This equipment should not be operated in an ambient with corrosive fumes of acid/alkali or corrosive gases such as chlorine.

This equipment is battery operated, do not connect with any other utility line. The normal operating conditions are indicated on its nameplate. When not in use, please switch off the instrument.

This equipment must have proper grounding for accurate measurement.

This equipment is likely to be damaged if dropped. In such an event, it should be carefully examined and any necessary repairs be made by an authorized technician. This is an electronic instrument and contains sensor that is sensitive to mechanical vibrations and shock. As it also contains a microcomputer chip and electronic circuitry, it should not be used in an environment where there is a lot of electromagnetic noise.

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, normally specified accuracy of 10 % cannot be guaranteed in this case.

Do not exert any pressure on the LCD display from the top.

The instrument has been calibrated for a measuring distance of  $25\pm 0.5$  mm. This calibration is not valid outside this distance. Do not tamper with the sensor location and the guiding LEDs for that could alter the measuring distance.

The equipment was assembled and inspected at Simco Japan, Inc. Do not attempt to disassemble or modify its construction. If you are not clear about its operation and maintenance, call Simco Japan's authorized agent in your area.

Thank you for buying Simco-Ion products. This equipment will meet your expectations and provide safe operation when it is properly installed and maintained.

## Checking the contents of package

Please carefully remove the equipment from the carton and inspect. Note any damage that might have occurred during shipment. Empty the carton to ensure that small parts are not discarded.

If any damage has occurred during shipment, the local carrier should be notified at once. A report should be forwarded to SIMCO JAPAN, INC. The address and other relevant informations are written on the back cover page.

## Packing contents

- |  |        |
|--|--------|
| (1) FMX-004 Electrostatic Fieldmeter .....                 | 1 pc.  |
| (2) Ion balance plate .....                                | 1 pc.  |
| (3) Grounding cord, 1 m long .....                         | 1 pc.  |
| (4) Soft case .....  | 1 pc.  |
| (5) Battery (type 6F22, 9 V) .....                         | 1 pc.  |
| (6) Instructions Manual / Warranty .....                   | 1 pc.  |
| Option   |        |
| • Grounding and Analog out cord, 1.8 m long / Bracket..... | 1 set. |

**Please check if any part is missing or does not have satisfactory finish. Contact us or our agents immediately in the event of such occurrence.**

# Section 1. GENERAL DESCRIPTION

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Simco-Ion Model FMX-004 Electrostatic Fieldmeter is a compact instrument used for measuring electrostatic potentials. It is small (pocket size), portable, handy and easy to use.

It has a micro-computer inside. The fieldmeter can be turned on/off by a push button POWER switch (red). A grey push button switch marked ZERO is used for zero adjustment. A green push button switch marked HOLD holds the display and is especially useful where the display is difficult to see during a measurement.

Simco-Ion Model FMX-004 can correctly measure static voltages within  $\pm 30$  kV (30,000 V) range at a distance of 25 mm. Two LED guide ring lights are provided on the sensor side of the unit to help position the instrument at the right distance from a charged object. The conductive case and ground lead facilitate grounding for proper measurement. Whenever the MODE button is pushed, the measurement mode is revokable.

Model FMX-004 can be used for static voltage as well as Ion Balance voltage measurements. Ion balance voltage measurement to  $\pm 300$  V is possible by attaching a Ion Balance Plate and using a light blue push button switch marked IB. The plate can be kept attached to either end of FMX-004 when not in use.

Compact design of this unit makes measurements easy and usable in relatively inaccessible work areas. It can be used in various applications such as in deciding the location of static eliminators, in investigating static charge levels, in deciding the need for charge neutralization, as a support for the maintenance of static eliminators etc.

## Section 2. FEATURES

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The special features of FMX-004 are;

**Compact and light body**

**Multi function micro-computer chip**

**Large digital display**

**Pos. (red) & Neg. (blue) Bar graph**

**Easy plate attachment for ion balance measurement**

**Digital zero function**

**Power supply automatic off function**

**Hold function**

**"Err" display for sensor fault**

**LED assisted distance indication**

**Battery condition display (4 stages)**

**Output voltage the measuring data in the analogue voltage.**

**Four measurement modes (AUTO, Hi, Low, Ionbalance)**

## Section 3. SPECIFICATIONS

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Static voltage measuring range: AUTO MODE

0 -  $\pm 1.49$  kV (Low range)

$\pm 1.0$  kV -  $\pm 30.0$  kV (Hi range)

HI Range MODE 0 -  $\pm 30.0$  kV

LOW Range MODE 0 -  $\pm 3.00$  kV

Ion balance voltage measuring range: 0 -  $\pm 300$  V

Measuring distance: 25 mm  $\pm$  0.5 mm (between charged object and fieldmeter)

Response time: less than one second

LCD display renewal rate: 5 times/second

Accuracy:  $\pm 10\%$

Ambient conditions: 10 - 40 and 0 - 60 %RH

Display: Large LCD display (digital and bar graph)

Bar graph: red LCD for positive polarity voltage

blue LCD for negative polarity voltage

Precision: • AUTO  $\pm 0.1$  kV for low range

$\pm 2.0$  kV for high range

- HI range  $\pm 2.0$  kV
- LOW range  $\pm 0.2$  kV
- Ionbalance  $\pm 20$  V

Digital reading: AUTO . 0.00 -  $\pm 1.49$  kV (Low range)  
 .  $\pm 1.0$  kV -  $\pm 30.0$  kV (Hi range)  
 HI range . 0.0 -  $\pm 30.0$  kV  
 LOW range . 0.00 -  $\pm 3.00$  kV  
 Ionbalance 0 -  $\pm 300$  V

[HOLD]: Retains display after a measurement

[A.OFF]: Auto power-off function deactivated

[Err]: Error sign if sensor is damaged

Battery condition display (4 stages)

Analog out: Response speed 40ms

Output Voltage : • AUTO  $\pm 3.00$  V (2.0 kV = 0.20 V)  
 • HI range  $\pm 3.00$  V (1.0 kV = 0.10 V)  
 • LOW range  $\pm 3.00$  V (2.0 kV = 2.00 V)  
 • Ionbalance  $\pm 3.00$  V (200 V = 2.00 V)

Beep sound at the time of the following functions:

- Power is turned on while pressing POWER switch less than 3 seconds: one beep
- Power is turned on while pressing POWER switch more than 3 seconds: three beeps (for cancellation of the auto power off function)
- Auto power off indication: At one second interval for five seconds before power is turned off
- Over range: Continuous warning sound

Auto power off: Power is turned off automatically if the unit is left on for five minutes approximately. For continuous operation red POWER button should be pressed more than three seconds when power is turned on.

Power: 9V, 6F22Y manganese battery; life: approx. 30 h

Overall size: 115 mm (L) x 73 mm (W) x 25 mm (H);

(without ion balance plate)

123 mm (L) x 73 mm (W) x 25 mm (H);

(with ion balance plate)

Weight: 140g with battery for Static charge measurement

170g with battery and ion balance plate

Case material: Conductive resin (ABS)

# Section 4. POWER SOURCE

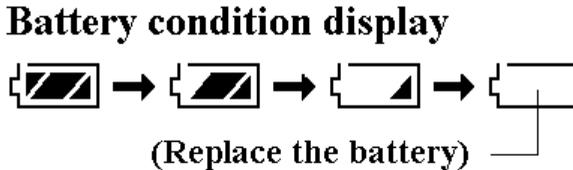
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## 4.1 Power source

This equipment is battery operated, do not connect with any other utility line. The battery is not installed at the time of shipment. Install the battery provided according to the procedure described in 5.2 Battery Replacement.

## 4.2 Battery Replacement

FMX-004 uses 9V, 6F22 Manganese battery. The life of the battery is about 30 hours. When FMX-004 is turned on, the battery condition is displayed as shown in the figure below. Replace the battery when display shows the battery to be empty.



## CAUTION

The dark area of battery indicator on the display is not proportional to the remaining energy.

### [Replacement procedure]

There is a battery compartment at the back side of FMX-004. Press down on the dented area marked "OPEN" and slide the lid open.

Remove the old battery carefully (if present).

Connect the new battery and insert it into the battery compartment. Make certain of the polarity. The battery is not installed at the time of shipment. A battery is enclosed in the same package.

Reattach the lid to the battery compartment.

## CAUTION

- Do not exert excessive pressure; it might damage the lid.
- Be careful while connecting or disconnecting a battery. Do not pull the plug by the connecting leads.
- The plug will be damaged when it is connected forcibly in the wrong polarity terminals.
- Before closing the cover, make sure that no part of the leads are outside the battery compartment.

# Section 5. MEASUREMENT

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FMX-004 has four button switches to perform many functions.

Button	Color	Name	Functions
POWER	Red	Power switch	Turns on and off the power, a white LED for brighter display and Auto Power Off function. Setting of ON-OFF of analog out mode
MODE	Blue	Mode switch	Changes the mode to measurement
HOLD	Green	Hold switch	Holds the measured value and the bar graph
ZERO	Gray	Digital zero switch	Adjusts the displayed value to zero

## 5.1 Grounding connection

The accuracy might be affected by the static charge on the person making the measurement if FMX-004 is ungrounded. For proper measurement, the operator should be grounded using a wrist strap and/or FMX-004 shall be grounded on the right side grounding socket by the grounding lead provided with the equipment.



## CAUTION

The plastic case of FMX-004 is made of conductive resin. The grounding terminal provides the reference potential for the electrical circuit. This terminal should be grounded properly for proper measurement. If it is not properly grounded, the accuracy is not guaranteed.

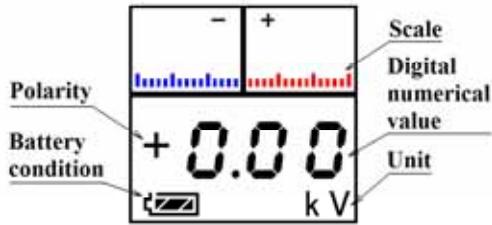
## 5.2 Selection of the measurement mode

There are 4 modes of operation based on whether Auto-off function is operative or not.

### 5.2.1 Standard mode for static charge (voltage) measurement

Press the center of red circle button switch marked "POWER" once after turning the sensor of FMX-004 toward an uncharged area. A single beep (0.25 second) sounds once to inform that FMX-004 is into standard mode.

As the power is turned on, LCD display shows digital numerical value, polarity sign, unit of measurement "kV", bar graph scale and battery condition. At this time, please confirm the state of the battery from "Battery condition display" as described in Section 5. The two red LEDs beside the sensor, also, turn on and FMX-004 is ready for static charge measurement.



Five minutes after the power is turned on, FMX-004 will turn itself off automatically. This is called "Auto power off function". In this case, a combination of two beeps (0.15 second on and 0.1 second off) sounds five times at one second interval to inform that FMX-004 will be turned off soon.

When the power is on, if POWER button is pressed, FMX-004 turns off and all indications disappear.

## **⚠ CAUTION**

- FMX-004 can be activated by pressing POWER button just once lightly. There is no need to press it repeatedly. Frequent unnecessary on/off operation or pressing by a nail may affect the life of switches and the cover sheet.
- In standard mode, the measurement cannot be done for more than five minutes when "Auto power off function" is operative. For more than five minutes measurement, select continuous measurement mode when power is turned on as described in the next section.

### **5.2.2 Standard mode for ion balance measurement**

FMX-004 can be used easily to measure ion balance voltage (offset voltage) for many kind of ionizers using a ion balance plate provided.

#### **5.2.2.1 Ion balance plate installation**

During static charge measurement, the ion balance plate is attached to the bottom end (opposite to that with the sensor) normally. For ion balance measurement it should be removed and attached to the top end having the sensor.

Press rear side release buttons from both side and draw out the ion balance plate.

Insert the plate into the sensor side slots until it clicks into place and stops as shown in the photograph below.

The plate should enter smoothly. It should not move when secured in place properly. Forcible insertion could result in damage to the unit.

In order to remove the plate after ion balance measurement, press sensor side release buttons from both sides and draw it out. The plate can be kept attached to either end of FMX-004 when not in use.

## CAUTION

- Make certain that the surface of a white plastic plate under the ion balance plate is clean before attaching it to FMX-004 for ion balance measurement.
- The ion balance plate should be stored or used in a place having less than 60 %RH.

### 5.2.2.2 Grounding connection

FMX-004 can be used to measure low voltages up to  $\pm 300$  V in the ion balance mode. It is important to connect it to ground using the grounding lead supplied, especially for ion balance measurement.

## CAUTION

The plastic case of FMX-004 is made of conductive resin. The grounding terminal provides the reference potential for the electrical circuit. This terminal should be grounded for proper measurement. The accuracy is not guaranteed for measurement with an ungrounded FMX-004.

### 5.2.2.3 Ion balance measurement

Initially, ground the plate to remove any static charge. Press the center of red circle button switch marked [POWER] once. A single beep (0.25 second) sounds to inform that FMX-004 is into standard mode.

Press the center of blue circle button switch marked [MODE] once. LCD display shows "IB" along with digital numerical value, polarity sign, unit of measurement "V", bar graph scale and battery condition. FMX-004 is, now, ready for ion balance measurement. The two red LEDs, located beside the sensor, do not light up. Please confirm state of the battery from "Battery condition display" as described in Section 4.

Five minutes after the power is turned on, FMX-004 will turn itself off automatically. This is called "Auto power off function". In this case, a combination of two beeps (0.15 second on and 0.1 second off) sounds five times at one second interval to inform that FMX-004 will be turned off soon.

Press [POWER] button again to turn off FMX-004. All indications disappear.

## CAUTION

- FMX-004 can be activated by pressing [POWER] button just once lightly. There is no need to press it repeatedly. Frequent unnecessary on/off operation or pressing by a nail may affect the life of switches and the cover sheet.

- In standard mode, the measurement cannot be done for more than five minutes when "Auto power off function" is operative. For more than five minutes measurement, select continuous measurement mode when power is turned on as described in the next section.

## Section 6. FUNCTION

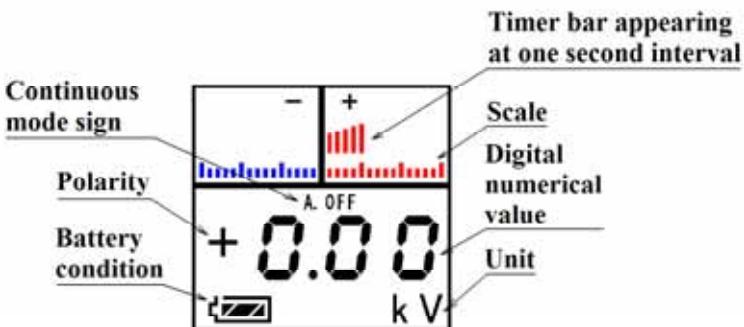
### 6.1 Continuous mode

Keep [POWER] button pressed for three seconds after turning the sensor side toward an uncharged area. The number of red bars in the upper right side bar graph on the display increases by one at one second interval. When three red bars appear, release [POWER] button. Three beeps (0.15 second on and 0.1 second off) inform that FMX-004 is into continuous measurement mode. This is called "Cancellation of the Auto power off function".

In continuous measurement mode, LCD display shows digital numerical value, polarity sign, unit of measurement "kV", bar graph scale, battery condition and "A.OFF". Please confirm the state of the battery. The two red LEDs for assisting in working distance adjustment should be turned on. FMX-004 is now ready for continuous static charge measurement.

One minute after power is turned on, the red LED will be turned off automatically in order to reduce the consumption of the battery. To turn the LEDs on again either press HOLD button twice or ZERO button once. Once turned on, LEDs remain on for one minute.

Press POWER button once again to turn off the unit after measurement. All indications disappear.



### ⚠ CAUTION

- FMX-004 cannot be turned off without pressing POWER button in continuous measurement mode. Confirm that power is turned off by observing the disappearance of all indicators. If power is not turned off, the battery will be drained completely.

- FMX-004 cannot return to this mode automatically, even if it is turned on again after turning off in continuous mode. For going into continuous mode, the operation described in 6.2.2 is should be carried out when power is turned on.

### 6.3 Zero adjustment by "Digital zero function"

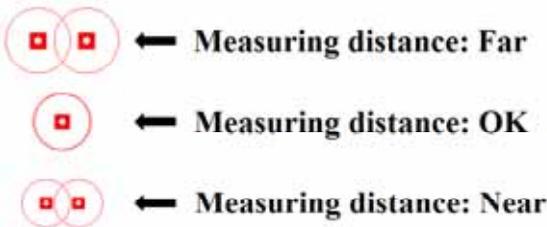
A gray button switch marked [ZERO] on the front panel can be used to adjust the reading to zero if the fieldmeter reading is not zero. To make FMX-004 read zero in this condition, press the button once turning the sensor toward an uncharged area.

## ⚠ CAUTION

- The digital zero function cannot be used for zero adjustment, if the reading of FMX-004 exceeds  $[\pm 0.30(\text{Au,Lo}), \pm 0.3(\text{Hi}), \pm 50(\text{IB})]$  approximately. Also, when in hold mode, the function is inoperative.
- If the reading is more than  $[\pm 0.30(\text{Au,Lo}), \pm 0.3(\text{Hi}), \pm 50(\text{IB})]$  in a measurement, the digital zero function is inoperative. However, if the reading is less than  $[\pm 0.30(\text{Au,Lo}), \pm 0.3(\text{Hi}), \pm 50(\text{IB})]$ , the real zero point would be shifted by this function when [ZERO] button is pressed.

### 6.4 Focussing LED

FMX-004 has two red LEDs on the sensor side of the unit to help position the unit at the right distance from a charged object. The measuring distance is 25 mm. With the sensor and LEDs pointing towards the charged object, slowly bring FMX-004 close from far till two light beams converge into a concentric circle.



## ⚠ CAUTION

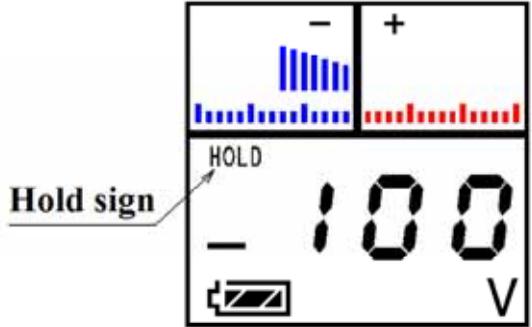
- The focussing distance of the two red light beams is adjusted to 25 mm in factory. It can be checked easily by directing the beams toward a white sheet of paper and moving the fieldmeter toward and away from the paper.

- If the reading blinks at over range with a continuous warning sound during the static charge measurement, maximum voltage reading limit has been exceeded. If this condition persists, the sensor of FMX-004 might be damaged. Please suspend the measurement in this case.

### 6.5 Hold mode

When the center of green circle button switch marked [HOLD] is pressed once during the measurement, the digital numerical value and the bar graph will be held on the display. This is called "Hold function".

This function allows the operator to move FMX-004 after measurement where it can be more easily read. [HOLD] is shown on the left side of the display; the red LEDs are turned off. Once FMX-004 is in hold mode, no more measurement is possible. One more pressing of the button will cancel the hold function to resume measurement again with the red LEDs turned on.



## ⚠ CAUTION

- The numerical value and the bar graph displayed on the LCD will change if FMX-004 moves during measurement. Hold function enables measurements in inaccessible areas.
- Please note that the display of measured voltage as the numerical value and the bar graph are not saved in FMX-004, even if it is turned off in hold mode. Data and mode informations will be lost by switching off the unit.

### 6.6 Analog out mode

Use the analog out cable of the option when you use an analog out. Moreover, it is a mini Jack specification of monaural 3.5mm. Can use a plug on the market. The tip of the plug (chip) is a signal wire when wiring, and the foundation side (sleeve) is grounded.

When "Aof" is displayed when the power supply is turned on, an analog out is turning off. Keep turning off the power supply once when an analog out is turned on and pushing the [POWER] button again. One bar graph in the upper right of the display display increases at intervals of one second. When the POWER button is separated when becoming five or more, "Aon" or "Aof" is displayed in the morrow.

# Section 7. TABLES OF FUNCTIONS

## 7.1 Function switches

Situation	Function switch	Color	Operations	Mode	Unit	Additional display
ON/OFF	POWER	RED	Pressing less than 3 seconds	Standard	kV	-
			Pressing 3 seconds or more	Continuous		A.OFF
			Pressing 5 seconds or more	Analog output	-	Aon/AoF
			Press once more to turn off	-	-	-
After Power ON	MODE	BLUE	AUTO. HI. LOW. ION BALANCE measurement ON/OFF.	Standard or continuous	kV/V	Au, Hi, Lo, IB
	HOLD	GREEN	Hold function ON/OFF. Holds the digital value and the bar graph information by pressing once.			HOLD
	ZERO	GRAY	Zero adjustment of the displayed values by pressing once. The display should read less than $[\pm 0.30]$ kV for static charge measurement and less than $[\pm 50]$ V for ion balance measurement for zero function to operate.			

## 7.2 Beep sounds

Once	Three times	Twice for five times each at one second interval	Continuous
「Pi」 0.25 seconds	「PiPiPi」 ON 0.15, OFF 0.1 seconds	「PiPi」 ON 0.15, OFF 0.1 seconds	「Piii」
When power is turned on. POWER button is pressed for less than 3 seconds.	When power is turned on. POWER button is pressed for 3 seconds or more.	5 seconds before stopping by auto power off function.	Measuring range exceeded

## Simco-Ion EQUIPMENT REPAIR WARRANTY

*Simco-Ion equipment has been carefully tested and inspected at the factory and is warranted to be free from any defects in materials or workmanship.*

*Simco Japan, Inc. will, under this warranty, repair or replace any equipment, which proves upon their examination, to have become defective within the Warranty period from the date of shipment. A one year Warranty applies to all Simco-Ion equipment. The equipment is to be returned by the purchaser to Simco Japan, Inc. or authorized agent of Simco-Ion, transportation prepaid and insured for its full purchase price.*

*Prior to returning any goods for any reason, contact Simco Japan, Inc. or authorized agent for a Return Authorization Number. This number must accompany all returns.*

*The Warranty does not apply when the equipment has been tampered with, misused, improperly installed, altered, has received damage through abuse, carelessness, accident, connected to improper line voltage, or has been serviced by anyone other than an authorized factory representative.*

*The warranty does not apply when Simco-Ion parts and equipment have been energized by other than appropriate Simco-Ion Power unit or generator, or when Simco-Ion Power unit or generator has been used to energize other than Simco-Ion parts and equipment.*

*Simco Japan, Inc. makes no Warranty, expressed or implied, nor accepts any obligation, liabilities or responsibility in connection with the use of this product other than the repair or replacement of parts as stated herein.*

Product Name	<b><i>Handy digital Electrostatic Fieldmeter Model FMX-004</i></b>		
Delivery Date	Product's serial number contains information on the shipping date.	Warranty Period	<b><i>A one year Warranty</i></b>



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