ELECTROSTATIC FIELD METER

Model : ESF-106

Your purchase of this ELECTROSTATIC FIELD METER marks a step forward for you into the field of precision measurement. Although this METER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

OPERATION MANUAL

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1. FEATURES

* Professional precision STATIC Voltage meter with 0.001 kV resolution.
* LSI - circuit provides high reliability and durability.
* Measurement range : -19.999 kV to +19.999 kV.
* High voltage alarm : +/- 18.000 kV.
* ALARM setting : 0.010 kV to 18.000 kV.
* Data hold , Records (Max. & Min.).
* LCD with green backlight.
* RS232 / USB Computer interface.
* Built-in low battery indicator.
* Power : (1) 9V alkaline or equivalent.

2. SPECIFICATIONS

2-1 General Specifications

Display	LCD size : 51 mm x 30 mm , Max. indication : ± 19999. LCD with backlight (On/Off).
Circuit	Custom one-chip of microprocessor LSI circuit.
Measurement	Static Voltage : -19.999 kV to +19.999 kV
Over input	" ---- " mark indication.
Zero adjustment	ZERO button.
Sampling time	Approx. 0.5 second .
Data hold	Freeze the display reading.
Memory recall	Maximum and Minimum value.
Data output	RS232/USB PC Computer interface. * Connect the optional RS232 cable UPCB - 02 will get the RS232 plug. * Connect the optional USB cable USB - 01 will get the USB plug.

Operation Temp.	0 ℃ to 50 ℃ (32 ℉ to 122 ℉).
Operation humidity	Less than 70% RH, non-condensing.
Power supply	Alkaline or Heavy duty type DC 9V battery. 006P , MN1604 (PP3) or equivalent
Power consumption	Approx. DC 6 mA
Weight	215 g / 0.476 LB
Dimension	195x68x30 mm (7.6x2.6x1.2 inch).
Accessories included	Instruction manual..... 1 PC 1" Magnetic Spacer..... 1 PC Ground wire..... 1 PC Ground CLIP..... 1 PC Carrying case, CA-06..... 1 PC
Optional accessories	* USB cable, USB-01 * RS232 cable, UPCB-02 * Data Acquisition software, SW-U801-WIN. * Excel Data Acquisition software, SW-E802.

2-2 Electrical Specifications

Static Voltage

Range	Resolution	Accuracy
+19.999 to -19.999 kV	0.001 kV	± (5%+50d)

Remark :

* Accuracy @ 23℃ ± 5℃
* The above spec. accuracy are tested under the environment . RF Field Strength less than 3 V/M & frequency less than the 30 MHz only .

3. FRONT PANEL DESCRIPTION

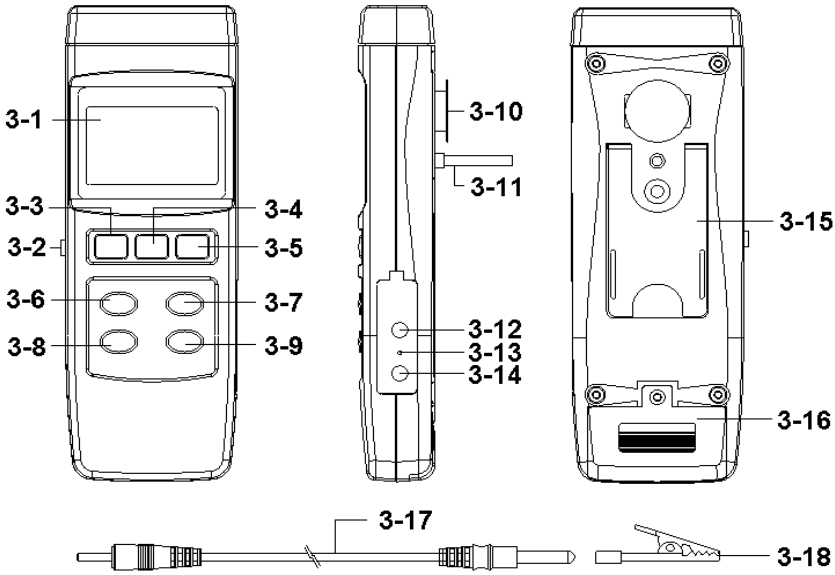


Fig. 1

3-1 Display
3-2 GROUND point
3-3 POWER / Backlight button
3-4 HOLD button
3-5 RECORD button (MAX. / MIN.)
3-6 ZERO button
3-7 ▲ button
3-8 ALARM button
3-9 ▼ button
3-10 SENSE disc
3-11 Magnetic SPACER
3-12 RS-232 output terminal
3-13 RESET button
3-14 GROUND terminal
3-15 Stand
3-16 Battery Cover / Compartment
3-17 EARTH wire
3-18 Alligator clip

4. MEASURING PROCEDURE

4-1 Power ON /OFF

1. Press the "POWER / Backlight button" (3-3 , Fig. 1) more than 2 seconds to Turn ON the meter.
2. Press the "POWER / Backlight button" (3-3 , Fig. 1) more than 2 seconds to Turn OFF the meter.
3 If no buttons are pressed in 10 minutes, meter will AUTO POWER OFF to save battery and meter life.

4-2 Grounding

Before using the meter it is necessary to install the grounding the meter. Choose one of the below two methods. Number 1 is the recommended method.

1. Use the accessories EARTH wire (3-17 , Fig.1) to connect to the building's EARTH ground from the meter "GROUND terminal" (3-14 , Fig.1). ie. From electrical outlet ground terminal.
2 Operator is attached to the EARTH ground by way of an Anti-static wrist strap (not provided), and finger placed on the "GROUND point" (3-2 , Fig.1).

4-3 Zero procedure

Before you measure the STATIC Voltage. If the meter has a reading on the screen .You can press the 'ZERO' button (3-6 , Fig.1) once to clear the reading.

4-4 STATIC Voltage measurement procedure

When measuring the STATIC Voltage . use the "Magnetic SPACER" (3-11 , Fig.1) to magnetically attach to the back of the meter, just below the "SENSE disk" (3-10 , Fig.1).
Distance between "SENSE disk" (3-10 , Fig.1) and test area is 1 inch (2.54 cm).

1. Press the "POWER / Backlight button" (3-3 , Fig.1) more than 2 seconds to Turn ON the meter.
2. Make sure the meter is grounded before operation.
3. Aim the "SENSE disk" (3-10 , Fig.1) toward the object (without touching the disk).

4. Keep your fingers away from the test area to avoid accidental discharge .
5. STATIC Voltage will be displayed on the screen .

4-5 ALARM Setting procedure

1. This meter has HIGH Voltage WARNING function . When reading is over 18.000 kV . the meter will beep to user . (this meter can reading over 19.990 kV.)
2. To change the voltage value to limit you can press the " ALARM button " (3-8 , Fig.1) more than 2 seconds to Turn ON the setting function and ALARM symbol will luminate. The first digit of alarm value will flash . Now you can press the " ▲ button " (3-7 , Fig.1) to increase the value . or press the " ▼ button " (3-9 , Fig.1) to decrease the value .
3. When you finish the first figures . you can press the " ALARM button " (3-8 , Fig.1) to setting next figures .
4. When you finish your limit value . you can press the " ALARM " button " (3-8 , Fig.1) more than 2 seconds to save the setting value & return to measuring mode .
5. If ALARM value is set to " 0.000 " kV , the ALARM function will be disabled.

4-6 Data Hold

During measurement, press the "HOLD Button" (3-4 , Fig.1) once, to hold the measured value (LCD will display a " HOLD " symbol . Press the " HOLD Button " (3-4 , Fig.1) once again will release the data hold function .

4-7 Data Record (Max., Min. reading)

1 The data record function records the maximum and minimum readings . Press the " REC Button " (3-5 , Fig. 1) once to start the Data Record function and there will be a " REC " symbol on the display .

2. With the " REC " symbol on the display :
   a) Press the " REC Button " (3-5 , Fig.1) once , the " REC MAX " symbol will appear on the display and LCD will be showing the maximum value.
   b) Press the " REC Button " (3-5 , Fig.1) again, the " REC MIN " symbol will appear on the display and LCD will be showing the minimum value.
   c) Press the " REC Button " (3-5 , Fig.1) again to return to the current reading.

3. To exit the memory recording function , just press and and hold the " REC button " (3-5 , Fig.1) for at least 2 seconds. The display will revert to the current reading.

4-8 LCD Backlight

1. You can turn ON the Backlight for to help see the display When use the instrument in a dark place or under the SUN .
2. While the instrument is powered up, Press the " POWER / Backlight button " (3-3 , Fig.1) once to turn on the light.

3. Press the " POWER / Backlight button " (3-3 , Fig.1) again will turn OFF the Backlight.

5. SYSTEM RESET

If the meter has any issues such as :
Screen or display is frozen or the key button cannot be operated. A system RESET will usually fix the problem.
To RESET: Turn the meter power on, at the same time use a pin to press the "RESET button" (3-13 , Fig.1).
This will reset the circuit system.

6. MAINTENANCE

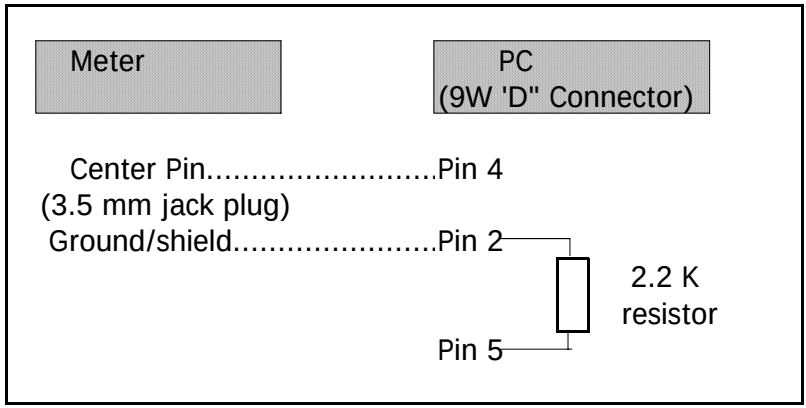
1 Instruments used in dusty environments should be stripped and cleaned periodically.
2 Do not leave the instrument exposed to direct heat from the sun for long periods.
3 Before removing the battery compartment cover, ensure that the instrument is disconnect from any circuit and the instrument is power OFF .

7. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-12, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format :

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

Each digit indicates the following status :

D15	Start Word, 02
D14	4
D13	1
D12, D11	Annunciator for Display
	DC kV = G9
D10	Polarity 0 = Positive 1 = Negative
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234
D0	End Word, 0D

RS232 FORMAT : 9600, N, 8, 1

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

8. BATTERY REPLACEMENT

1) When the Top left corner of the LCD display shows " LoBAT " , it is necessary to replace the battery. Meter should still function for several hours after LOW BATTERY INDICATOR appears before the instrument becomes less accurate.
2) Open the screw of " Battery Cover " (3-16 , Fig.1)by screwdriver, then remove the battery.
3) Replace with 9V battery and reinstall the cover.