Operating Instructions

F00029y

Electric Field Meter EM03

BA-en-1020-2203

ellex
electrostatic
innovations

List of Contents

Dear Customer

The EM03 Electric Field Meter is a small, compact unit with digital display for measuring static charges directly in Volts. The mode of function of the instrument is based on the influence principle.

The integrated micro-computer automatically converts the measured field-strength over the pre-selected measuring distance (distance between measured object and measuring electrode) into charges in Volts.

The distance between object and measuring electrode is selectable between 1 and 20 cm. Charges of up to 200 kV can be measured; if 1,000 Volts are detected, the instrument automatically switches over into the kV display range.

The electric field meter is a parametric amplifier. The charges influenced by the electrical field generate an alternating current proportional to the field strength. This alternating current is measured via a selective amplifier without drawing time-averaged energy from the electrical field. No radio-active substances are used in the instrument.

Please read these instructions carefully before starting the unit. This will help you prevent personal injuries and damage to property.

Please give us a call if you have any suggestions, proposals or ideas for improvements. We greatly appreciate the feedback from the users of our appliances.

1. Outline of appliance

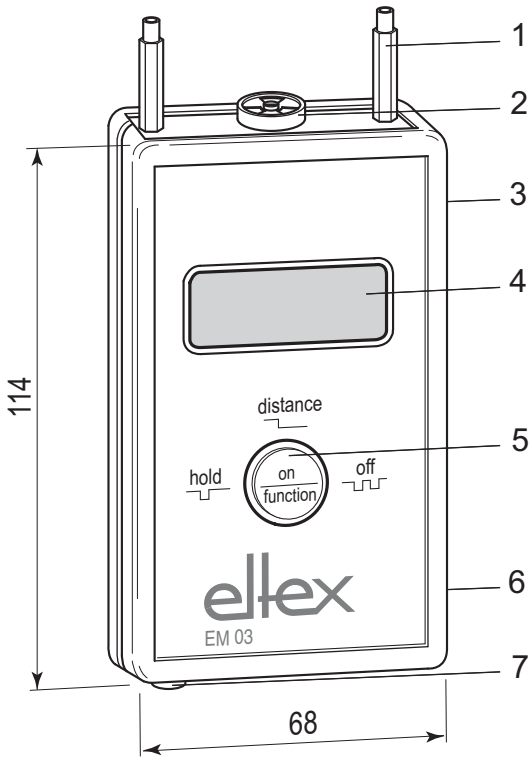

Fig. 1: Outline of appliance EM03

1 Spacer (2 cm)

2 Modulator system (measuring sensor) with protective cap

3 Zero trimmer (side-mounted)

4 LC display (2 x 12 characters, alphanumerical)

5 Function key ON/OFF, HOLD, DISTANCE

6 Battery compartment (rear)

7 Ground socket for connecting the ground cable

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Delivery Electric Field Meter EM03:

- Electric Field Meter EM03
- Coiled cable for ground connection, 2 meters, with split plug and alligator clip
- 9 V-Ni-MH-battery pack
- Battery charger
- Instrument case
- Operating instructions
- Works calibration certificate de-en-fr

The instrument is encased in an antistatic plastic housing with membrane front plate.

The star-shaped influence measuring electrode is built into an aluminium front plate. A modulation wind mill-type wheel of the same star shape, connected to frame, rotates a short distance ahead of the electrode. A ring electrode system enclosing the influence electrode serves as mechanical protection.

2. Safety

The units have been designed, built and tested using state-of-the-art engineering, and have left the factory in a technically and operationally safe condition. If used improperly, the units may nevertheless be hazardous to personnel and may cause injury or damage. Read the operating instructions carefully and observe the safety instructions.

For warranty conditions, please refer to the General Terms and Conditions (GTC), see www.eltex.de.

2.1 Identification of risks and hazards

Possible risks and hazards resulting from the use of the units are referred to in these operating instructions by the following symbols:

Warning!
This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in serious personal injuries.

Caution!
This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in damage to property.

2.2 Technical advance

The manufacturer reserves the right to make changes to the technical specifications without prior notice in order to adapt the units to state-of-the-art engineering. Eltex will provide the latest information on any changes or modifications in the operating instructions on request.

2.3 Proper Use

The EM03 Electric FieldMeter must be used only for measuring static charges. The unit is not approved for explosion hazard areas and must on no account be used in this environment.
The use of the unit in power installations is not permitted.

The manufacturers will not assume any liability and warranty if the system is used improperly or used outside the intended purpose.

Modifications and changes made to the electric field meter are not permitted.

Use only original Eltex spare parts and accessories.

2.4 Work and operational safety

Warning!
Carefully observe the following notes and the complete chapter 2 "Safety", page 7!

- The unit must not be used in the explosion hazard area and in power installations (see chapter 3 "Operation", page 9).
- Alternating fields > 1 Hz cannot be measured with this instrument.
- When measuring high static charges, the electric field meter must be grounded using the alligator clip supplied with the unit.
  The first measurement must be made from a sufficient distance to ensure that the maximum applied surface potentials are determined from a safe measuring distance (see chapter 3 "Operation", page 9).
- Spark discharges onto the modulator system must be avoided.
- After switching the unit off and back on, the unit always returns to the 2 cm measuring distance setting (see chapter 3 "Operation", page 9).
- Use only alkaline or lithium 9 V block batteries or Ni-Cd- or Ni-MH-rechargeable batteries.
  When using rechargeable batteries, recharge in a suitable charger outside the unit. Observe manufacturer´s instructions (siehe chapter 3.4 "Battery monitoring", page 11, chapter 4.1 "Battery change / battery disposal", page 12).
- Exhausted batteries may be returned to us or must be disposed of properly (hazardous waste) see chapter 4.1 "Battery change / battery disposal", page 12 .
- The components of the modulator system must not be touched. Keep the components free of dust, dirt, ink and paint vapours and do not expose the unit to condensation water (see chapter 4 "Maintenance", page 12).
- Before each use of the unit, we recommend a check of the zero point (see chapter 4.2 "Zero setting", page 12).
- We recommend returning the unit to Eltex at yearly intervals to check the measured values (see chapter 4.3 "Calibration", page 12).

3. Operation

3.1 Startup

Warning!
The instrument must NOT be used in explosion hazard area.

When measuring extremely high static charges, the electric field meter must be grounded using the alligator clip supplied with the unit. The first measurement must be made from a sufficient distance to ensure that the maximum applied surface potentials are determined from a safe measuring distance.
To obtain reliable results on magnitude and polarity of the measured electrical field, the unit itself must be adequately grounded.
Connect the instrument to ground via the grounding cable and the grounding socket (7, Fig. 1) (bondingconductor).

During normal use it is sufficient if the person taking the measurements is grounded (e.g. conductive footwear or touching grounded machine parts) and touches the grounding socket (7, Fig. 1).

The unit is switched on by pressing the "function on"-key on the front plat (5, Fig. 1). Pressing the key twice in brief succession during normal operation will switch the unit off.

Note!
The unit will switch off automatically after five minutes to avoid battery exhaustion. Switch the unit back on for subsequent measurements.

3.2 Taking measurements

Remove the protective cap from the modulator system.
The preset measuring distance after switching on is 2 cm.

If this setting is used for measurements, hold the instrument at a distance of 2 cm from the object to be measured. This measuring distance is ideal in most cases because it will allow you to measure charges of up to 20 kV (see Technical Specifications). When measuring at a distance of 2 cm, use the spacers mounted in the aluminium plate next to the modulator system.

There are instances when the measuring distance ought to be changed.

For instance, if you have very high static charges or a very rough surface on the measured object, the measuring distance ought to be increased.

On the other hand, if you have very small static charges, and if the surface of the object measured allows, you should select the smallest measuring distance of 1 cm.

The top line of the display shows the selected measuring distance in cm, the bottom line shows the measured charge in Volts. If 999 V are reached during measurement, the unit automatically switches to the kV display range. The measured value is always displayed with three digits, 578 V; 3,85 kV; 24,0 kV or 274 kV.

If the message "overflow!" appears on the display, select a larger measuring distance!

Changing the measuring distance

Keep the "function/on" key pressed until the bottom line of the display shows "change distance" (approx. 2 sec). The topline shows the current distance in cm. You can now change the distance by briefly pressing the "function/on". The setting changes every time you press the key:
2 cm => 5 cm => 10 cm =>20 cm => 1 cm => 2 cm and so on.

As soon as the desired setting appears in the display, wait **without** pressing the "function/on" key until the bottom line again shows the current measuring value. The top line now shows the newly selected distance. This measuring distance is now used for any subsequent measurement. The measuring distance results from the distance between the measuring electrode (behind the modulator wheel) and the measured object. The measuring electrode is located 3 mm ahead of the front of the unit. For this reason 3 mm must be added to every distance value when taking measurements from the front (aluminium plate).

Caution!
After switching the unit off and back on, the unit always returns to the 2 cm measuring distance setting!

HOLD

The instrument is equipped with a Hold function to "freeze" the measured value. The value measured at this point in time is held in the display by briefly pressing the "function/on" key once. The top line will show "Hold", the bottom line will show the measured value. The Hold function is switched off by again pressing "function/on" key briefly. The current measured value appears.

3.3 Power supply

The instrument is supplied via a 9 V block battery inside the unit. In continuous operation the service life is approx. 10 hours.

3.4 Battery monitoring

The instrument is equipped with a permanent battery voltage monitoring function. If the battery voltage drops below 7.5 V, the top line of the display shows "Low Battery!" In this case the 9 V block battery must be replaced or recharged. If the battery voltage drops below 7.0 V the bottom line of the display signals "auto off" for about 2 seconds. The unit will then switch off automatically to avoid battery exhaustion and battery leakage.

Caution!
Use only alkaline or lithium 9 V block batteries or Ni-Cd- or Ni-MH-rechargeable batteries.

When using rechargeable batteries, recharge in a suitable charger outside the unit. Observe manufacturer´s instructions!

Exhausted batteries may be returned to us or must be disposed of properly (hazardous waste).

4. Maintenance

The components of the modulator system must not be touched. Keep the components free of dust, dirt, ink and paint vapours and do not expose the unit to condensation water. Use spirit and a lint-free cotton cloth to clean the modulator carefully, if required. Avoid bending or deforming the modulator wheel!

4.1 Battery change / battery disposal

If the display show the message "Low Battery" replace the 9 V block battery or recharge the battery. To change the battery, turn the unit over and open the battery compartment. Remove the battery and pull off the battery clip. Push the battery clip over the new battery, put the assembly back in the compartment and close the compartment.

4.2 Zero setting

Before each use of the unit, we recommend a check of the zero point. If, with the modulator system protected (e.g. by covering the modulator system by hand and the testing person being grounded), should it any time fail to display U = 000 V, the zero setting can be readjusted via the side-mounted trimmer (3, Fig. 1). The last digit of the display may be neglected because the measuring error caused by it would be substantially smaller than the permitted tolerance.

4.3 Calibration

We recommend returning the unit to Eltex at yearly intervals to check the measured values.

5. Technical specifications

Measuring ranges Measuring distances 1cm Measuring distances 2 cm Measuring distances 5 cm Measuring distances 10 cm Measuring distances 20 cm	 -10 kV…0…+10 kV, max. resolution 1 V -20 kV…0…+20 kV, max. resolution 2 V -50 kV…0…+50 kV, max. resolution 5 V -100 kV…0…+100 kV, max. resolution 10 V -200 kV…0…+200 kV, max. resolution 20 V
Housing	antistatic plastic with membrane front panel
Protection class	IP40
Dimensions	114 x 68 x 25 mm (L x W x H) 141 mm with spacer and grounding socket
Weight	175 g (with battery)
Sensor	star-shaped influence measuring electrode
Display	2-line alphanumerical LCD, 2 x 12 digits
Batteries	9 V alkaline or lithium block battery Type IEC 6F22 or Ni-Cd- or Ni-MH batteries
Operating period	approx. 10 hours continuous operation
Measurement system calibration	In the homogeneous field of a plate capacitor, plate size 100 mm x 100 mm, plate spacing 20 mm, modulator system installed centered in the frame plate.

CE

6. Accesories and spare parts

Article	Article no.
Ground cable with plug and alligator clip	LEI00318
9 V-Ni-MH battery	ELM00092
Instrument case	101450
Battery charger	101448
Operating Instructions (specify language)	BA-xx-1020

Please specify the article number when ordering.

EU-Declaration of Conformity

CE-1020-en-2104

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declares in its sole responsibility that the product

Electric Field Meter EM03

complies with the following directives and standards.

Relevant EU-Directive:	
2014/35/EU	Low Voltage Directive
Harmonized standard applied:	
EN 61010-1:2010 + A1:12019 + A1:2019/AC:2019	Safety requirements for electrical equipment for measurement, control and laboratory use – General requirements
Relevant EU-Directive:	
2014/30/EU	EMC Directive
Harmonized standard applied:	
EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) Generic standards – Emission standard for industrial environments
Relevant EU-Directive:	
2011/65/EU	RoHS Directive

in the version effective at the time of delivery.

Eltex-Elektrostatik Gesellschaft mbH keep the following documents for inspection:

- proper operating instructions
- plans
- other technical documentations

Weil am Rhein, 09.04.2021
Place/Date

Lukas Hahne, Managing Director

Eltex offices and agencies

The addresses of all Eltex agencies can be found on our website at www.eltex.de

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