

## Statometer II





Types:	Statometer II with analog display	12.7215.000
	Statometer II with digital display	12.7209.000

**Keep in a safe place for future reference!**

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### Incoming inspection:

1. Check the contents of the package for completeness.
2. Perform a visual inspection to determine any damage to the unit due to transportation.
3. In case of missing parts or other defects, complain to the forwarder without delay.
4. Inform a representative of the company HAUG GmbH & Co. KG in order to ensure that the unit is repaired or replaced.

## 1 Notes on operating instructions

In these operating instructions, the Statometer II is also referred to as "the unit".

### 1.1 Pictorial markings used

In these operating instructions



**Attention!**  
**Important instructions!**



**Warning!**

## 2 Safety

The unit has been constructed and tested in accordance with the safety regulations for measuring and control equipment and has left the plant in perfectly safe condition.

In order to maintain this status and ensure safe operation, observe the instructions and warnings contained in these operating instructions.



***Do not open the unit!***  
***Do not use ordinary batteries!***  
***Only use NiMH cells!***

### 2.1 Intended use

The Statometer II is intended for the measurements of electric fields on flat surfaces. It provides fast measurements of electric fields created, for example, through charges on surfaces of plastic, paper, glass and other materials.



**Surfaces must be larger than the measuring head diameter (Ø 30 mm).  
In case of convex or concave surfaces, the measuring value will be falsified!**

For reasons of safety, unauthorized conversions and modifications of the unit are not permitted. The installation and operating conditions indicated in these Operating Instructions must be adhered to.

### 2.2 Storage of the Statometer II

For storage, remove the rechargeable batteries from the battery compartment underneath. Check the rechargeable batteries before putting the Statometer II into operation and recharge, if necessary.

### 2.3 Danger sources

In cases where safe operation cannot be ensured, switch off the unit and secure it against being switched on inadvertently.

Terminals may be energized.

### 2.4 Operator qualifications

The unit and its related components may be put into operation, used and maintained only by persons who have read the operating instructions and follow the instructions, notes and safety advice.

### 3 Design, control elements

Figure 1

1. Pushbutton switch (unit off)
2. Pushbutton switch (unit on and range selection)
3. Display (digital or analog)
4. Carrying handle / stand
5. Recorder output
6. Measuring head port
7. Ground connection

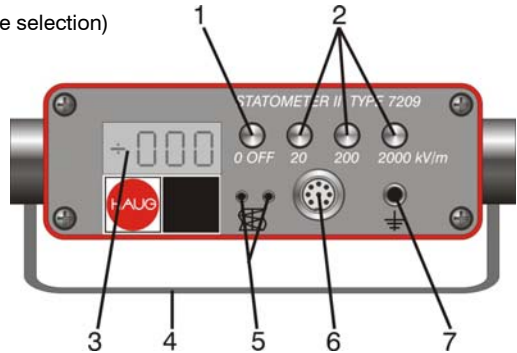


Figure 1

Figure 2

8. Set mains voltage
9. Fuse holder
10. Socket for non-heating apparatus

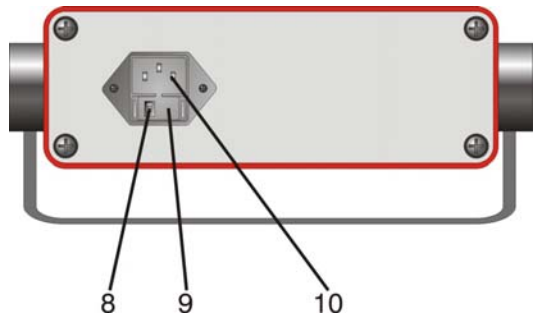


Figure 2

Figure 3

11. Measuring head
12. Measuring head connector
13. Impeller



Figure 3

## 4 Preparing the initial start-up

The unit and its related components may be put into operation, used and maintained only by persons who have read the operating instructions and follow the instructions, notes and safety advice.

### 4.1 Setting up, connecting

1. Before connecting, always check whether the unit is suitable for use with the local mains voltage. The unit is designed for operation with rechargeable battery, 230 V and 115 V. The mains voltage is indicated by the number on the fuse holder (Section 3, item 8). To change the mains voltage, refer to Section 4.2 Mains voltage. The unit will be destroyed if used with wrong mains voltage.
2. Set up unit at the desired location. Do not place the unit on a surface generating or radiating heat. Avoid locations exposed to direct sunlight.
3. Ensure that the unit is switched off (off-switch depressed, refer to Section 3, item 1).
4. Ground the unit via the ground connector (Section 3, Pos. 7) using the enclosed grounding cable.
5. Plug the measuring head connector into the measuring head port (Section 3, item 6) and screw tight.
6. If required, a recording instrument can be connected to the recorder output (Section 3, item 5).
7. Connect the Statometer II to the mains unless working in battery mode.
8. Put unit into operation.



**In case of battery operation, always ensure grounding!**

**The display will indicate low battery voltage.**

**Analog = Both polarity LEDs light up**

**Digital = LO BAT is displayed**

**Protect measuring head from contamination (e.g. water, oil).**

## 4.2 Setting the mains voltage

On delivery from the factory, the unit is set to a voltage of 230 V. Check the set mains voltage by reading the number on the fuse holder (refer to Section 3, Para. 2).

### Changing the voltage range:

1. Switch off the unit and isolate from the mains.
2. Pull the cable out of the socket for non-heating apparatus at the rear of the unit.
3. Detach the fuse holder in the socket (spring lock) and pull out.
4. Replace the fuse (230 V = 100 mA slow; 115 V = 200 mA slow).
5. Pull out the fuse with the fuse cage from the fuse holder and reattach after turning by 180°. The new voltage range is now visible on the fuse holder.
6. Reinsert the fuse holder into the socket. Press the fuse holder until the spring lock snaps into place on both sides.



**When setting the mains voltage range, ensure that the correct fuse is used (refer to Section 7.2).**

## 4.3 Inserting the NiMH batteries

The NiMH batteries are charged when the unit is connected to the mains.

1. Open the cover underneath the unit.
2. Insert the batteries observing the polarity marking.
3. Close the cover.



**Observe the polarity when inserting the batteries. Only use NiMH cells!**

## 5 Application

### Preconditions:

The Statometer II and its components must have been connected correctly.  
The position of the Statometer II does not affect its functioning.

### 5.1 Determination of the field intensity

1. Check whether the chassis ground connection has been made. No reliable measurements can be made unless the unit is grounded via the ground terminal (Section 3, item 7).
2. Pull the protective cap from the measuring head and check for contamination. Clean, if required (refer to Section 7.1).
3. Keep the measuring head away from electric fields to perform the zero calibration. Press the range selector button. The impeller in the measuring head now turns, and the unit will perform an automatic zero calibration.
4. Move the measuring head vertically towards to the measuring surface. The measuring distance amounts to 30 mm.
5. Read the amount and polarity of the field intensity measured from the display.
6. In case of a capacitor field, the value displayed is not corrected. In case of measurements on flat surfaces, the displayed value will be corrected by a factor of 1.5.

<b>Example:</b>	Measuring value	12 kV/m
	Capacitor field	$12 \text{ kV/m} \times 1 = 12 \text{ kV/m}$
	Surface area	$12 \text{ kV/m} \times 1.5 = 19.2 \text{ kV/m}$



**Surfaces must be larger than the measuring head diameter (Ø 30 mm).  
In case of convex or concave surfaces, the measuring value will be falsified!**

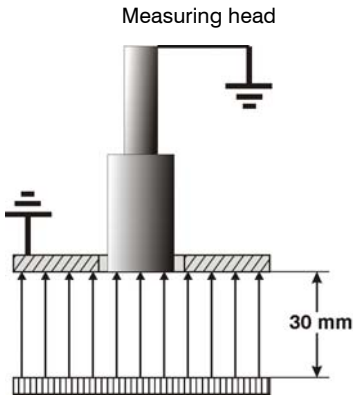


***In case of very high field intensities and insufficient measuring distance, a sparkover to the measuring head may occur.***



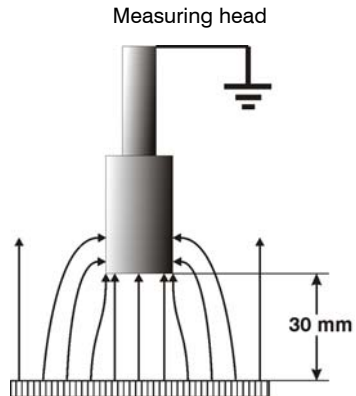
**Measuring examples:**

Example 1



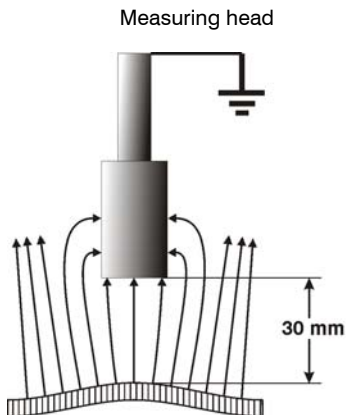
Capacitor field  
display x 1.5

Example 2



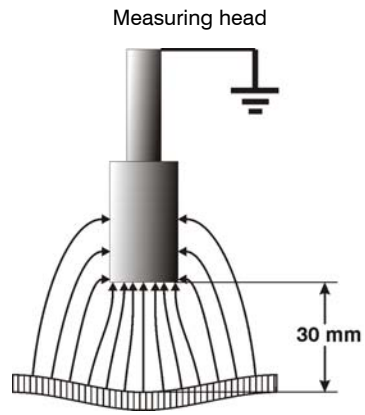
Flat surface  
(calibrated in a capacitor field with a plate size  
300 mm x 300 mm)

Example 3



Convex surface  
indicated measuring value too small

Example 4



Concave surface  
indicated measuring value too high

## 5.2 Determination of potential

The potential (voltage level) of the measured surface area can be determined from the field intensity measuring value.

The following relationship applies:

Field intensity (in kV/m) x measuring distance (in m) = Potential (in kV)

The measuring distance for the Statometer II is: 30 mm = 0,03 m

**Example:** Field intensity determined = 12 kV/m

Potential (in kV) = 12 kV/m x 0,03 m = 0.36 kV = 360 V

## 5.3 Determination of charge density

The surface charge density is proportional to the normal component of the electric field. The connection is made using the absolute permittivity  $\epsilon_0 = 8,86 \times 10^{-12} \text{ As/Vm}$ .

The charge density therefore results from the equation

Charge density = field intensity x absolute permittivity

For the above example:

$\sigma = 12 \text{ kV/m} \times 8,86 \times 10^{-12} \text{ As/Vm} = 106,32 \times 10^{-9} \text{ As/m}^2$

## 6 Remedy of defects

In case of malfunction in connection with the Statometer II, first check for correct installation and fusing (for replacement, refer to Section 7.2). If this does not solve the problem, please return the Statometer II and the measuring head to HAUG for a check-up.

## 7 Maintenance and repairs

This unit does not include any parts which can be repaired by the operator. HAUG only is authorized to repair or calibrate the unit.

Should the unit prove defective or if a defect is suspected, switch off unit immediately and secure against subsequent reuse.

### 7.1 Cleaning

The measuring head, and in particular the impeller (refer to Section 3, Fig. 3), must be free of contamination with water, oil or dust. Clean any contamination from the impeller in the measuring head using a dry, soft brush. Any deformation or damage to the impeller will result in false measuring results.

### 7.2 Changing the fuse

1. Switch off the unit and isolate from the mains.
2. Pull the cable out of the socket for non-heating apparatus at the rear of the unit.
3. Detach the fuse holder in the socket (spring lock) and pull out.
4. Replace the fuse.
5. Reattach the fuse holder.

**Use the following fuses only:**

Unit type	Mains voltage range	Fuse
Statometer II	115 V	200 mA slow; 5 x 20 mm
Statometer II	230 V	100 mA slow; 5 x 20 mm

Only use fuses of the type indicated.

### 7.3 Accessories

Measuring head with 60 cm coiled cable  
Laboratory cable with 4 mm plug  
4 NiMH batteries, 1.2 V  
Swan-neck  
Clamp for measuring head  
Magnetic holder  
Measuring record block  
Portable measuring case with insert and writing pad

## 8 Technical data

### 8.1 Characteristics and specification

Reference temperature 23 °C

#### Display:

Digital (12.7209.000)

Analog (12.7215.000)

3<sup>1</sup>/<sub>2</sub> -digit liquid-crystal display

Moving-coil instrument with mirrored scale,  
polarity display by means of light-emitting diodes  
3 mm

#### Measuring ranges:

Range 1

-20 kV/m to +20 kV/m

Range 2

-200 kV/m to +200 kV/m

Range 3

-2000 kV/m to +2000 kV/m

Measuring distance

30 mm

#### Analog output:

Output voltage

-2 V to +2 V ( I<sub>max</sub> = 0.2 mA )

#### Measuring accuracy:

Digital

±10 %

Analog

±15 %

#### Over-range:

Digital

Display indicates I.

Analog

Pointer exceeds the upper scale value

#### Battery check:

Digital

Display indicates LO BAT

Analog

Both polarity indicating diodes light up

### 8.2 Supply voltage

#### Mains:

Voltages

115 V / 230 V (+6 % / -10 %)

Frequency range

50 – 60 Hz

Frequency tolerance range

47,5 – 66 Hz

Power input

10 VA

#### Rechargeable battery operation:

Number of cells

4 NiMH round cells (AA)

Cell voltage

1,2 V

Battery operation time

approx. 5 h at 800 mAh cell capacity

### 8.3 Ambient conditions

#### Ambient temperature:

Reference value	+ 23 °C ±1 °C
Rated application range	0 °C to +40 °C
Extreme range for storage and transport	-20 °C to +60 °C

#### Humidity:

Reference range	45 % to 75 % RF
Limit range of operation	10 % to 85 % RF
Rated application range	20 % to 80 % RF
Extreme range for storage and transport	0 % to 85 % RF

#### Air pressure:

Reference value	1013 mbar
Rated application range	800 mbar to 1060 mbar

#### Flow rate of ambient air:

Reference range	0 m/s to 0.2 m/s
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#### Vibrations:

Extreme range for storage and transport	max. 1.5 g (10 to 55 Hz), 1 h Shock: max. 15 g in each direction
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### 8.4 Housing

Protection type	IP 20
Mains connection	Mains cable via socket for non-heating apparatus

#### Dimensions:

Height	approx. 66 mm
Width	approx. 211 mm
Depth	approx. 180 mm

Weight	approx. 1 kg
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made by



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