Operating instructions Statometer III

HAUG GB

Measuring device for electric fields

Test Line

V05

Incoming inspection:

1. Check the contents of the package for completeness.
   - Statometer III
   - CD with Windows software „Statosoft“, System Requirements: Win 9x, Win NT, Win XP with SP2, 5 MB of available hard disk space
   - Optical transmission cable
   - Measuring head with 60 cm coiled cable
   - Grounding cable with 4 mm plug
   - 5 NiMH cells, 1.2 V 2100 mAh / 2300 mAh
   - Swan-neck
   - Clamp for measuring head
   - Magnetic holder
   - Portable measuring case with insert
   - Operating Instructions
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.

Table of contents

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Keep in a safe place for future reference!

Types: Statometer III

1 Notes on operating instructions

In these operating instructions, the Statometer III is also referred to as "the unit".
The NiMH cells are also referred to as "rechargeable batteries".

1.1 Pictorial markings used

➢ In these operating instructions

WARNING!

CAUTION!
Important instructions!

2 Safety

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

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.

2.1 Intended use

CAUTION!
Surfaces must be larger than the measuring head diameter (Æ 60 mm)!
In case of convex or concave surfaces, the measuring value will be falsified.

The Statometer III 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.

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 III

For storage, remove the rechargeable batteries from the battery compartment overleaf. Check the rechargeable batteries before putting the Statometer III 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, operating elements

Figure 1

1. LED green (Charge)
2. LED red (Error)
3. Mains switch
4. Measuring head port
5. Ground connection
6. Analog output
7. Display
8. Baud rate

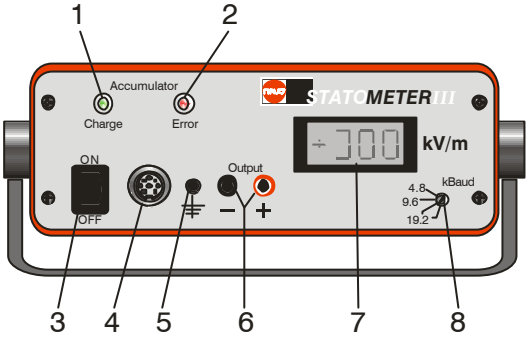


Figure 2

9. Serial interface and analog output (Pin9 = +; Pin10 = GND)
10. Battery chambers
11. Handle
12. Set mains voltage
13. Fuse holder
14. Socket for non-heating apparatus

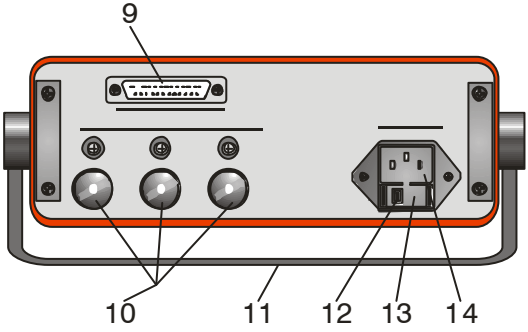
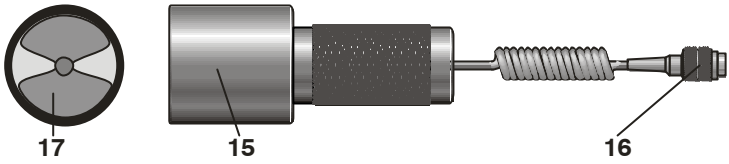


Figure 3

15. Measuring head
16. Measuring head connector
17. Impeller



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

CAUTION!
In case of rechargeable battery operation, the unit must be grounded by the ground connection (refer to Figure 1, item 5, page 8)!
The display indicates LO BAT when the voltage of the rechargeable batteries is to low!
Protect measuring head from contamination (e.g. water, oil).

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 and 230 V. The mains voltage is indicated by the number on the fuse holder (refer to Figure 2, item 13, page 8). Incorrect mains voltage may result in damage to the unit.
2. Set up unit at the desired location. Push the arrest button on both sides of the handle to change position. 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.
4. Ground the unit via the ground connector (refer Figure 1, item 5, page 8) with the enclosed grounding cable.
5. Plug the measuring head connector (refer to Figure 3, item 16, page 9) into the measuring head (refer to Figure 1, item 4, page 8) port and screw tight.
6. If required, a recording instrument can be connected to the analog output (refer to Figure 1, item 6, page 8).
7. Connect the Statometer III to the mains unless working in rechargeable battery mode.
8. Put unit into operation.

4.2 Inserting the rechargeable batteries

CAUTION!
Observe the polarity when inserting the rechargeable batteries!
Only use NiMH cells!

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

1. Open the covers (refer to Figure 2, item 10, page 8) overleaf the unit.
2. Insert rechargeable batteries according to the polarity marking (positive terminal pointing towards the cover).
3. Close the covers.

5 Application

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

5.1 Determination of the field intensity

WARNING!
In case of very high field intensities and insufficient measuring distance, a spark over to the measuring head may occur!
The measuring head could be damaged!

CAUTION!
Surfaces must be larger than the measuring head diameter (Æ 60 mm)!
In case of convex or concave surfaces, the measuring value will be falsified.
The impeller (refer to Figure 3, item 17, page 9) must not be damaged!

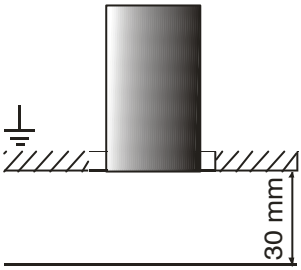
1. Check whether the chassis ground connection has been made. No reliable measurements can be made unless the unit is grounded via the ground terminal (refer to Figure 1, item 5, page 8).
2. Pull the protective cap from the measuring head and check for contamination. Clean, if required (refer to Section7.1, page 17). Always put the protective cap on the measuring head after the use.
3. Move the measuring head vertically towards to the measuring surface. The measuring distance amounts to 30 mm.
4. Read the amount and polarity of the field intensity measured from the display.
5. 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 0.86.

Example:	Measuring value	12 kV/m
	Capacitor field	12 kV/m x 1 = 12 kV/m
	Surface area	12 kV/m x 0,86 = 10,32 kV/m

Measuring examples:

Example 1

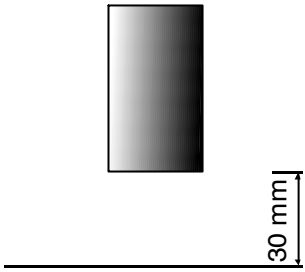
Measuring head



Capacitor field

Example 2

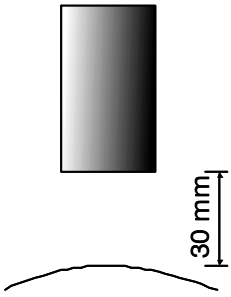
Measuring head



Flat surface
display x 0,86

Example 3

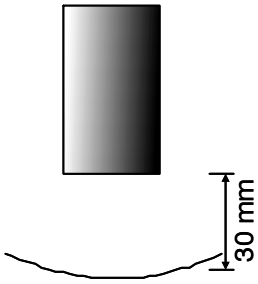
Measuring head



Convex surface
indicated measuring value too high

Example 4

Measuring head



Concave surface
indicated measuring value too small

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 III 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 ε_0 = 8,86 x 10^{-12} As/Vm.
The charge density therefore results from the equation:
Charge density = field intensity x absolute permittivity
For the above example:
σ = 12 kV/m x 8,86 x 10^{-12} As/Vm = 106,32 x 10^{-9} As/m^2

5.4 Rechargeable battery operation

green LED	red LED	
off	flashing	**Rechargeable battery errors:** - No rechargeable batteries inserted - Wrong insertion of rechargeable batteries - Short-circuit in rechargeable battery
flashing	off	Quick charging mode activated
on	off	Rechargeable batteries charged

After “Lo Bat” has appeared for the first time on the display, the remaining charge of the rechargeable batteries will last for approx. 30 minutes. In order to be able to maintain the process trouble-free, the Statometer III should be connected to the mains. The rechargeable batteries will then be charged from the mains during operation.

5.5 Serial interface

CAUTION!
For data transmission to PC, the correct baud rate has to be set (refer to Figure 1, item 8, page 8).
The fibre optic transmission cable must not be buckled and pulled!

The measuring data can be plotted as a time curve at the PC using the optical transmission cable and the STATOSOFT software. This allows the representation of short-term (with high measuring rate) and long-term measurements.
The PC has to be connected with the unit over the optical transmission cable at the serial interface (refer to Figure 2, item 9, page 8). Also an USB-Adapter (refer to chapter 7.3, page 18) is offered as accessories.

5.6 Analog output

The analog output (refer to Figure 1, item 6, page 8) is for the connection of measuring or data acquisition device with an input resistance R > 10 k? and a voltage level of +/-10 V. The output voltage of the analog output increases linearly with increasing electrical field strength from 0 V at 0 kV/m to ±10 V at ±2000 kV/m.
The output voltage of the analog output is independent from the measuring range.

6 Remedy of defects

In case of malfunction in connection with the Statometer III, first check for correct installation and fusing (for replacement, refer to Section 7.2, page 17). If this does not solve the problem, please return the Statometer II and the measuring head to HAUG for a check-up.

6.1 Troubleshooting

Faults	Measures
No value is indicated	Check if the impeller turns
	Check all connections
The unit does not function in rechargeable battery operation	Recharge batteries
	Clean electrical contacts from the rechargeable batteries

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

CAUTION!
The impeller (refer to Figure 3, item 17, page 9) must not be damaged! Don't forget to put the protective cap on the measuring head after cleaning or measuring!

The measuring head, and in particular the impeller (refer to Figure 3, Section 17, page 9), 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 III	230 V	100 mA slow; 5 x 20 mm

Only use fuses of the type indicated.

7.3 Accessories

Article			Order number
USB-Adapter for serial interface			On request
Signal line K7 (incl. plug, assembled)	5 m	shielded	06.8977.000
Signal line K7 (incl. plug, assembled)	10 m	shielded	06.8977.001
Signal line K7 (incl. plug, assembled)	20 m	shielded	06.8977.002

8 Technical data

8.1 Characteristics and specification

Reference temperature 23 °C

Display:	
Digital	3,5-digit liquid-crystal display
Measuring ranges:	Automatic switching
Range 1	0 kV/m to ±20 kV/m
Range 2	±20 kV/m to ±200 kV/m
Range 3	±200 kV/m to ±2000 kV/m
Measuring distance	30 mm
Frequency limit for alternating electrical fields	20 Hz
Measuring accuracy:	±10 %
Analog output:	Analog
Output voltage	±10 V
Over-range:	
Digital display	Display indicates -1

8.2 Supply voltage

Mains:	
Voltages	230 V
Frequency range	50 – 60 Hz
Power input	10 VA
Rechargeable battery operation:	
Quantity	5 NiMH
Types	Mignon (AA)
Voltage	1,2 V
Capacity	2100 mAh / 2300 mAh
Battery operation time	approx. 5 h
Battery charge current	approx. 0,6 A

8.3 Ambient conditions

Ambient temperature:	
Rated application range	+10 °C to +40 °C
Extreme range for storage and transport	-15 °C to +60 °C
Humidity:	
Limit range of operation	10 % to 85 % RH
Rated application range	20 % to 80 % RF
Extreme range for storage and transport	0 % to 85 % RF
Air pressure:	
Rated application range	800 mbar to 1060 mbar
Vibrations:	
Extreme range for storage and transport	max. 1.5 g (10 to 55 Hz), 1 h
Shock	max. 15 g in each direction

8.4 Housing

Degree of protection	IP 20
Connection to supply voltage	Mains cable via socket for non-heating apparatus
Dimensions:	
Height	approx. 85 mm
Width	approx. 245 mm
Depth	approx. 180 mm
Weight:	approx. 2.4 kg

9 Disposal

Observe and maintain national and regional waste disposal regulations for the disposal of the unit!

made by

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