Manual

Elektrofeldmeter EFM 115

Small E - Field meter with high sensitivity to measure static DC-fields and electrostatic charge according the field mill-influenz-principle
with USB – Interface to connect to a PC etc.

Contents

General information of the principle of electrostatics

Electrostatic discharging is a today problem on many working places with the use of modern micro-electronics as e.g. Microchips and their sensibility against it.
There is also a very strong danger for industrial branches as e.g. Telecommunication-, Plastics-, and manufactures of explosives.
The loss in manufacturing time as well as high financial damage and the affection of the health of persons may be caused by ESD (electrostatic dischargement).
It is possible that electrical charges of over 10.000 V can build up on human clothes, materials, and equipment.
Damage on electronic components may already occur with a charge of less as 100 V and charges of 3.000 V are able to flash and may be the result of explosion in hazardous areas.

What is the result of electrostatic charge

Trough friction and separation of different materials the so called - Tribo Electricity - (it stays for the Greek word tribeia which means friction) will be generated.
The reason is a transfer of electrons between the two materials.
Since the charge of electrons is negative the material depleting electrons has a positive charge, compare the material enhances electrons shows a negative charge.
There are different ways to prevent or divert electrical charges. However, to find a useful and effective way, first the source and the charge of the electrostatic field should be located and polarity and strength measured.
To do so as well as check any chosen steps against electrostatic charge or to control desire charge our Electro-Field meter is recommended.

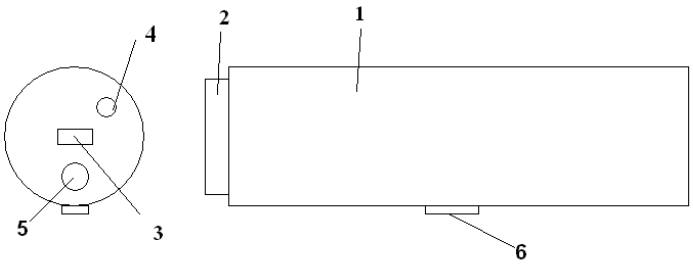
Description

The modulator-system with the complete electronic is integrated in a metal tube-housing.
The metal–tube is connected to ground.
The influenz–measure-electrode is in shape of a star. In front of this electrode rotates a ground-connected modulation-vane-wheel with the same shape. These parts are hard-gold-plated to prevent galvanic distortions. An influenz-electrode covers the ring-electrode-system for mechanical protection.
At the back-side there is a balanced-potentiometer to adjust the offset.
The signal-output to the PC etc. occurs about a Mini - USB – Interface connector.
The USB also powers the unit – Interface.

Technical Data

Dimension (L x B x H):	app. D36mm x 120mm
Weight:	app. 180g
Calibration in a plate capacitor:	200mm x 200mm, Distance 25mm
Ranges:	5kV/m, 20kV/m, 50kV/m und 200kV/m
Tolerance:	< 5%
Power supply:	5V max 100mA by USB Interface Connect to Ground bay a 4mm socket
Operating-time:	By 8 hours a day min. 2 years
Interface:	Mini – USB - Interface
Warranty:	24 months

Legende



1 nickel-plated Housing pipe
2 Modulator system
3 USB Mini Interface
4 Zero Adjust
5 Erdungsbuchse 4mm
6 M6 Threat socket for table tripot

Operating instructions

Measurement method

The E-field meter is a parametric amplifier. The electrical field causes an alternated current proportional to the field strength. These current can be measured with a selective amplifier, without taking away energy of the electrical field.

Through using gold-plated influenz-electrodes no galvanic disturbances are induced.

There is no radioactive material in use!

Field of application

Detection and *Control* of the electrostatic Field and measuring electric or electrostatic charges and extreme highly resistive voltage supplies.

Before Measure remove the red cap on the modulator system!

Zero adjust

First put on the red cap onto the modulator system. Then press in the EFM115_ReadOut Software the “Zero Adjust” button.

If an error message appears, you should make a Zero adjust by the potentiometer (4) on back of the unit. Adjust the measure value < 50mV and press the “ok” button at the software.

After it start a new “Zero Adjust” until “Zero adjust o.k. appears.

Then disconnect the red cap from the modulator system.

Calibration

We recommend a new calibration every year.

Connection

Use to connect the USB – Interface a standard USB cable with “Mini-USB” plug

Calculating the electric / electrostatic charge

To calculate the charge (V) multiply the field strength (E) with the distance (A).

Example: Measured Field strength (E) = 50 kV/m

Object-distance ==> field plate of the static-field meter = 5 cm (0,05m)

Charge [V] = field strength [E] * distance [A] (in meter)

U = E x A = 50.000 V/m x 0,05 m = 2500 V

By EFM115_ReadOut Software you can select the distance (in cm).

The Software converts measured field strength (E) by the distance to charge (V).

Voltage measuring with the voltage head MK11

By the optional voltage head MK11 you can measure charges up to 2.500 V with an internal resistance of Ri >> 10^{15} Ohm

By high voltage measurements the directives of the standard EN 10100 are be followed.

For using the MK1 mount it on the modulator system of the EFM 115. At the voltage head MK11 there is a PTFE isolate field plate in 1cm arranged.

By this you get the following voltage range:

- ±50 V
- ±250 V
- ±500 V
- ±2,5 kV (maximaler Messwert)

Select in the EFM115_ReadOut Software the option „Voltmeter "!

The resulted linear volt meter has the following excellent qualities:

Input capacity	ca. 5pF
Input resitance	>$10^{16}\Omega$ by clean head

EFM115_ReadOut

With the provided software EFM115_ReadOut the EFM 115 can be pursued directly in a PC etc. with „windows" operating system.

The USB interface powered the EFM 115.

The USB - interface protocol can be downloaded from our home page under support:

http://www.kleinwaechtergmbh.de

Installation

- Put the CD in a free disk drive
- for 32Bit – Systems start EFM115_setup_x86.exe
- for 64Bit – Systems start EFM115_setup_x64.exe
- following the installation instructions

Connect EFM 115!

The drivers for the unit is in root: ***c:\drivers !***

Start Software EFM_read_out.exe!

Grounding

The appliance must be grounded to get real measuring results.
You can connect ground by the 4mm socket on the back.

Maintenance

Don´t touch the modulator system!
Time by time the modulator-system needs to be cleaned and a new offset – adjustment with shielded field-plate is necessary. For cleaning use a lint-free cotton cloth.

Caution! ***Absolute avoid a deformation of the modulator.***

Warranty

By normal use conform to this manual we give you a warranty of 24 moth.

By opening the housing, you lose the warranty.

Damages by hard high voltage estimates, wrong grounding and mechanical damages are excused from the guarantee,

Warning - Instructions

- This measuring - head is not for measuring in explosive-areas!
- The usage in power-installations is not allowed!
- With this unit, it is not possible to measure alternated fields > 1 Hz.
- The static-field meter must be grounded every time.
- The first measurement must be made in a sufficient distance, so that the maximal possible surface-potential is detected in a safe distance.
- Sparkle-discharge to the modulator-system can destroy the electronic and is to avoid absolutely.

Parts of delivery

The following parts belong to basic equipment:

- Electro – Field - Meter EFM 115
- shield cap
- USB – cable with Mini plug 1,5m
- Spiral ground cable 2 m with alligator clip
- CD with EFM115_ReadOut Software
- Table tripod
- ESD – case with foam
- Manual
- Calibration certification

Optional accessories

Voltage measuring head MK11 mit Banana socket (see picture)