

STATIC ELECTRICITY

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Problems due to static electricity

Ignition of flammable gases and dusts:

petrochemical, explosives, plastics, printing, pharmaceutical, food product (loss of plant/production, damage to personnel)

Shocks:

paper, packaging and printing industries, car seats, flooring (indirect risk of accidents and damage)

Attraction of dust and debris:

(affects performance and cosmetic appearance)

Cling of thin films:

(difficulty in handling films and thin fabrics, cling of lingerie)

Damage to semiconductor devices:

(added costs to production and reduced reliability)

Upset operation of electronic systems:

(data corruption, process control malfunction)

Applications for static electricity

Constructive uses:

- *air cleaning (electrostatic precipitation),*
- *paint spraying*
- *photocopying*
- *clamping of surfaces*

STATIC ELECTRICITY

'Static electricity' arises when contacting surfaces separate.

If charge cannot move over the surface quickly enough (compared to time of separation) then it is trapped - it is 'static'

*Quantities of charge may be small
- but if capacitance low then voltages may be very high.*

MEASUREMENTS

Measurements needed to show:

- Is there a problem due to static electricity?*
- With what features of plant/operations is problem associated?*
- How to know if remedial actions effective?*
- How to choose appropriate materials?*

Basic aspects of measurements

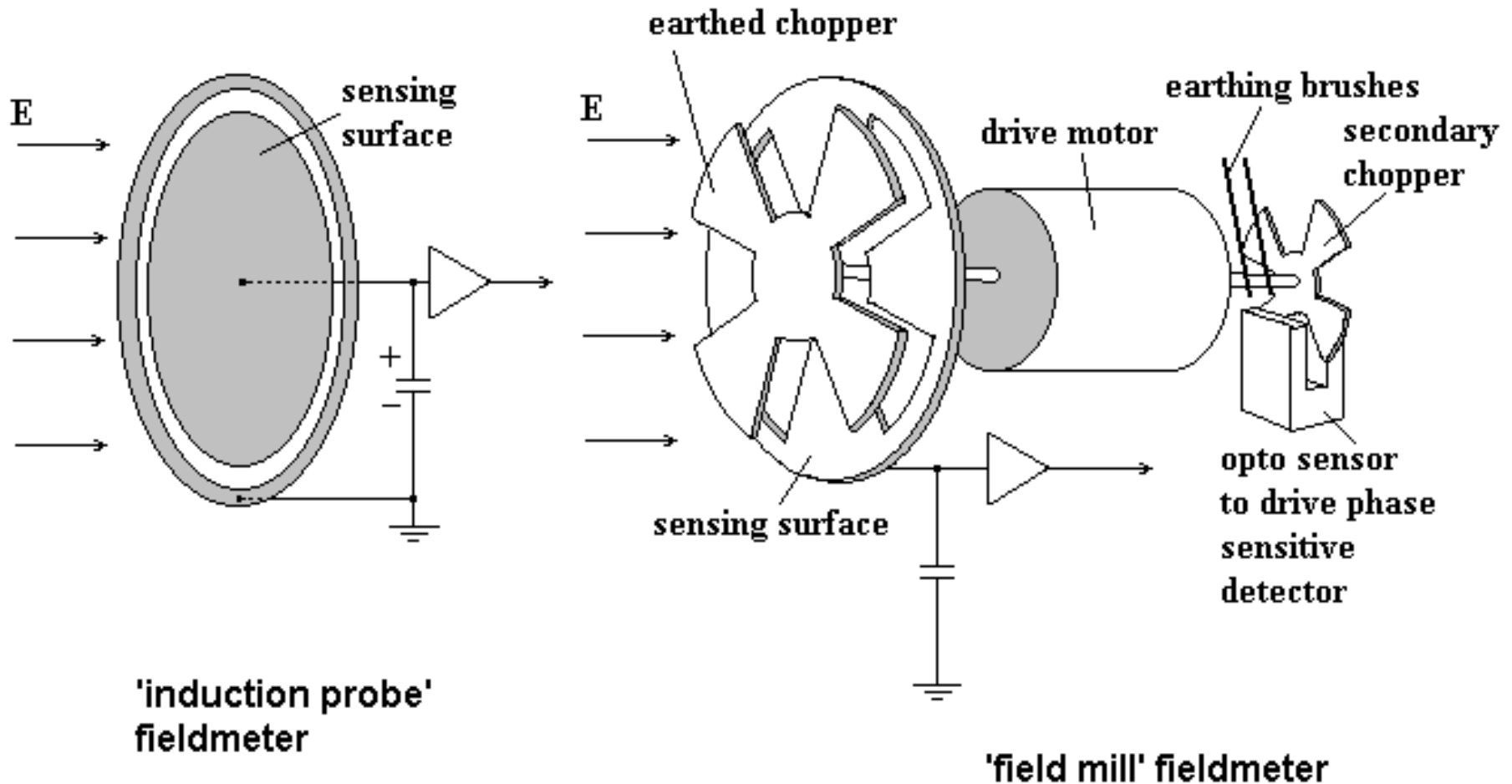
*Primary parameter is **charge***

Charge can be measured directly (Faraday Pail).

*More appropriate to measure the influence of charge via **electric fields** created.*

If you have a good means to measure electric fields you can measure most parameters of interest in electrostatics.

Electrostatic fieldmeters



Comments on fieldmeters

Induction probe fieldmeters of limited use

- *zero & reading drift*
- *susceptible to nearby ionisation*

'Field mill' instruments more universally useful

- *stable zero and reading, high sensitivity*
- *immune to air ionisation*
- *earthed chopper instruments*
 - *have wear problems affecting life.*
 - *difficult to get fast response.*

Fieldmeter with chopper not earthed

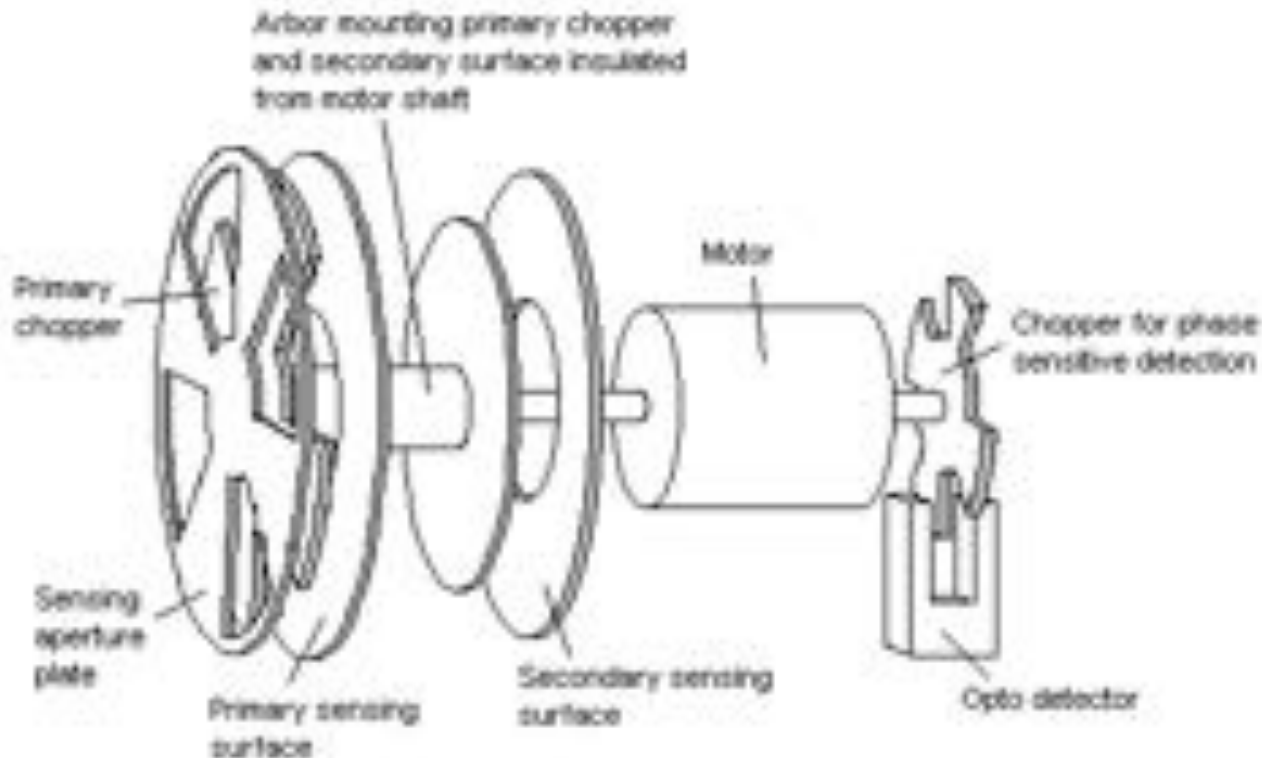
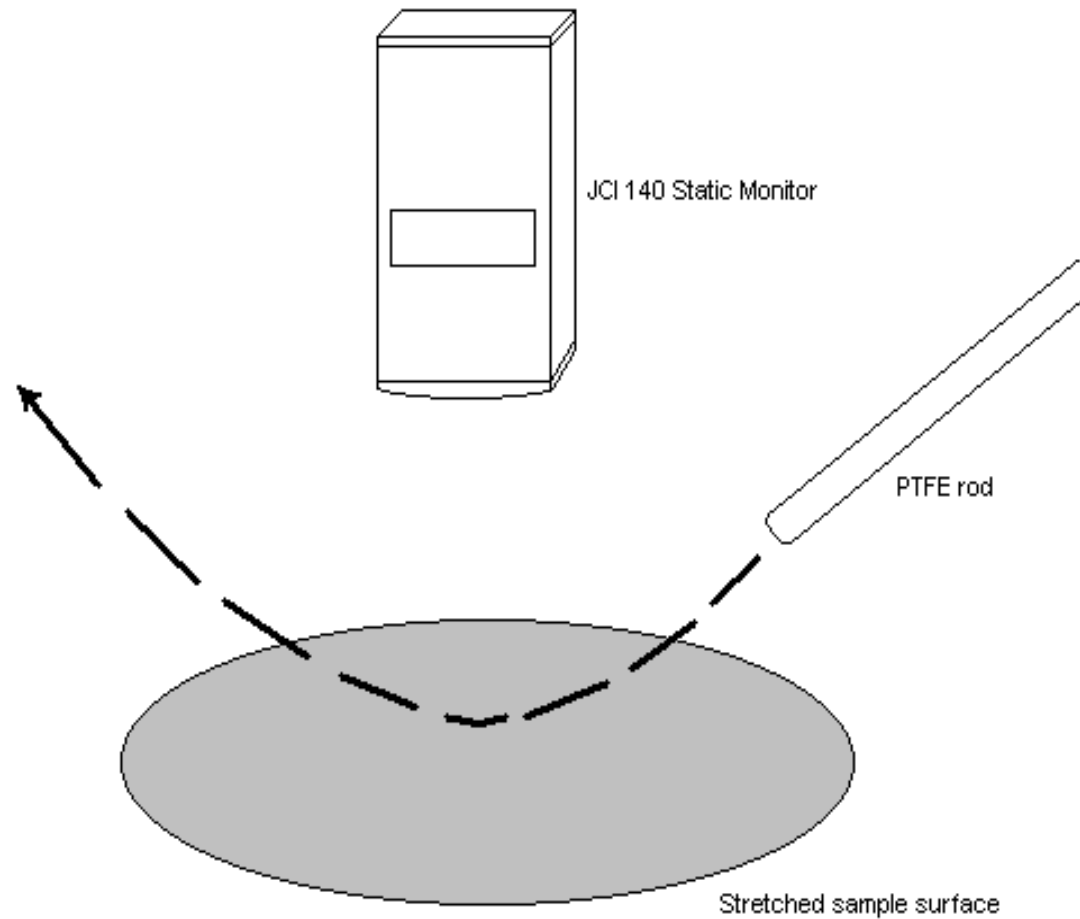
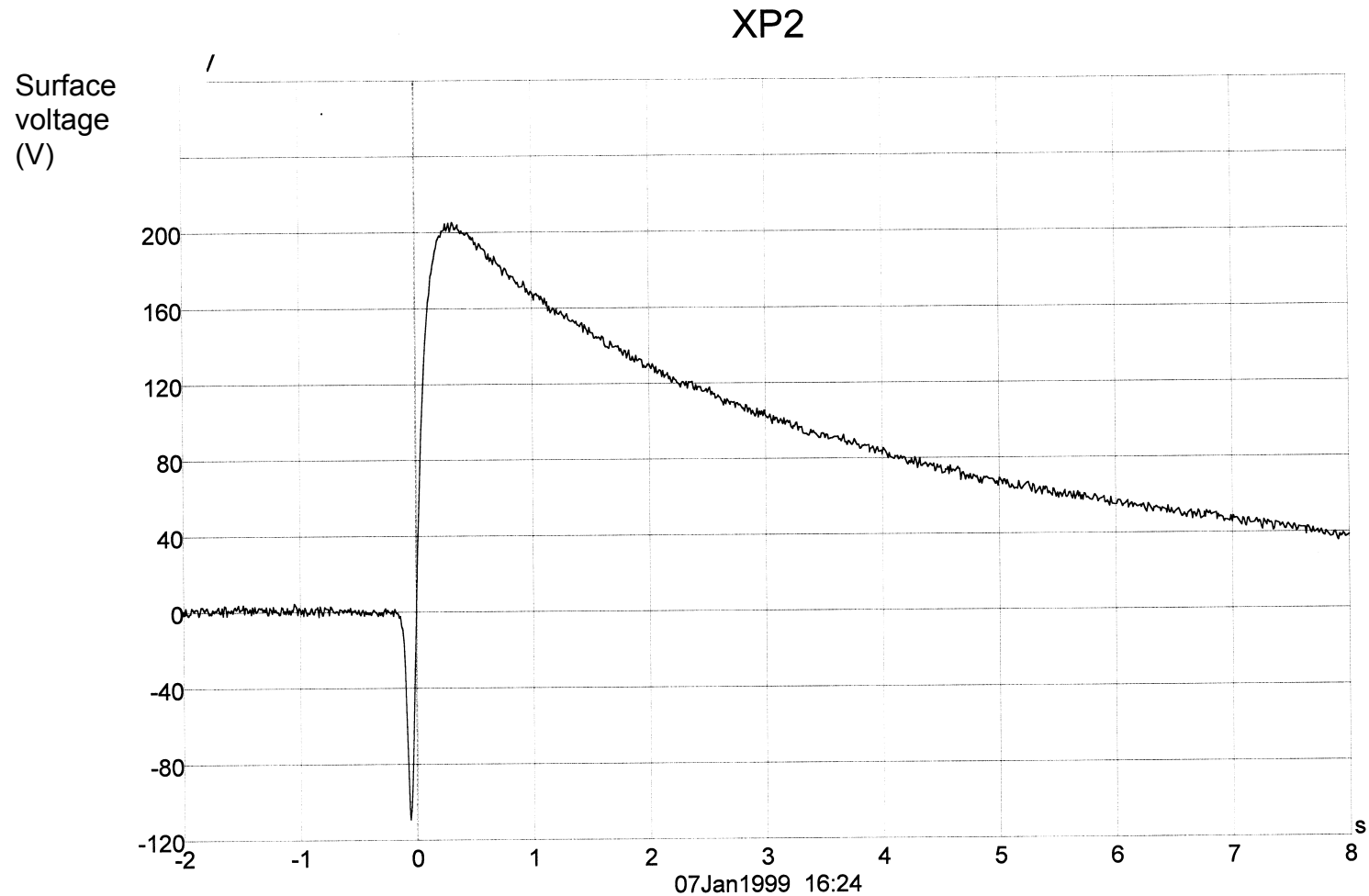


Figure 1: Basic arrangement for 'back to back' fieldmeter

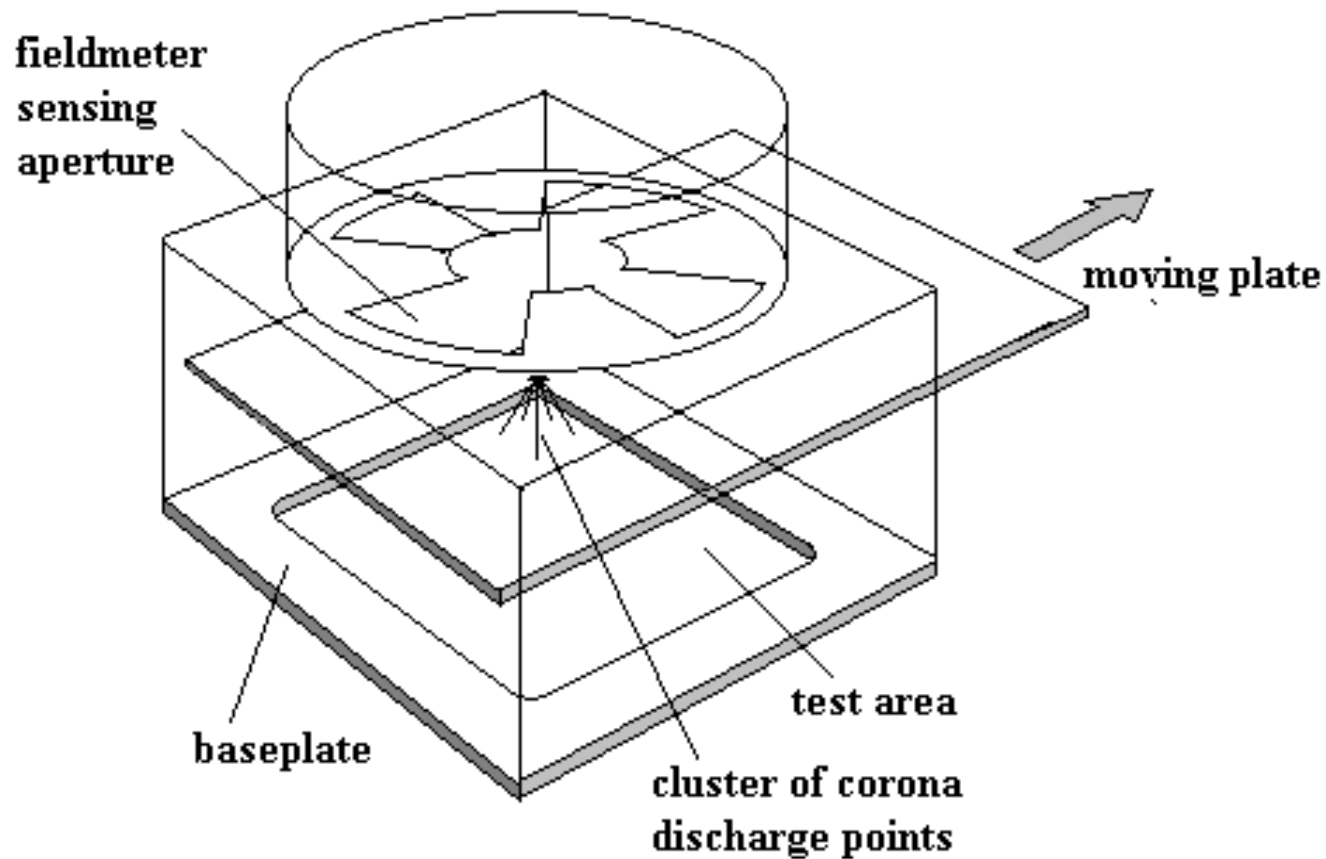
Scuff charging to assess materials



Example of scuff charging signal



Corona charge decay measurement



Examples of corona charge decay results

