

Partial Discharge

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Partial discharge

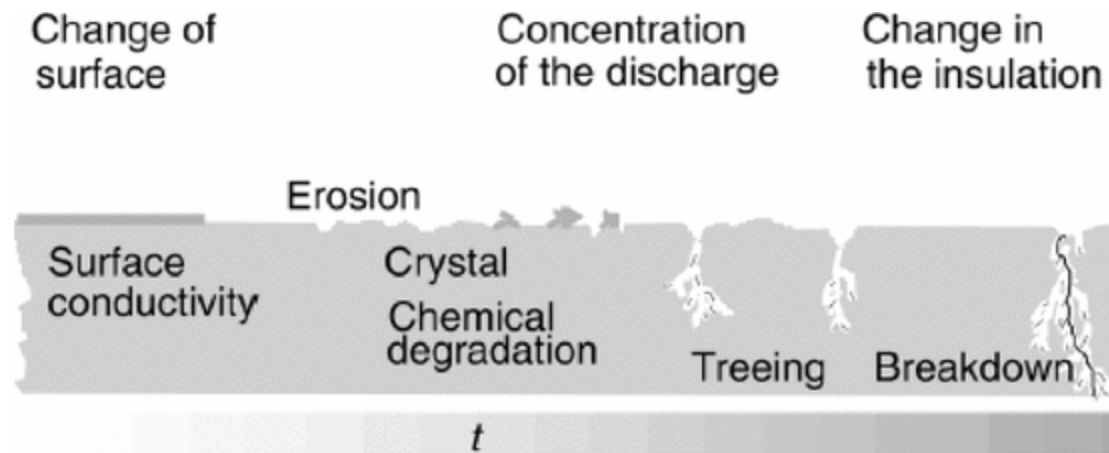
- Definition: An electrical discharge that partially bridges insulation between conductors
- Considered as a precursor to total insulation failure but may exist for long period of time.
- Discharge leads to chemical or physical breakdown of the insulation which in turn reduces its electrical strength, eventually causing breakdown

Partial discharge causes

- Voids within insulation like gas bubbles in liquid insulation
- Contamination/damage of insulation material
- Irregularities on the surface of the insulating material
- External conditions like temperature and humidity

Partial Discharge induced degradation

- After initialization, partial discharge can propagate and result in electrical breakdown or fault
- Ways of propagation: Either physical or chemical
- Examples: erosion, continuous sputtering, tree formation

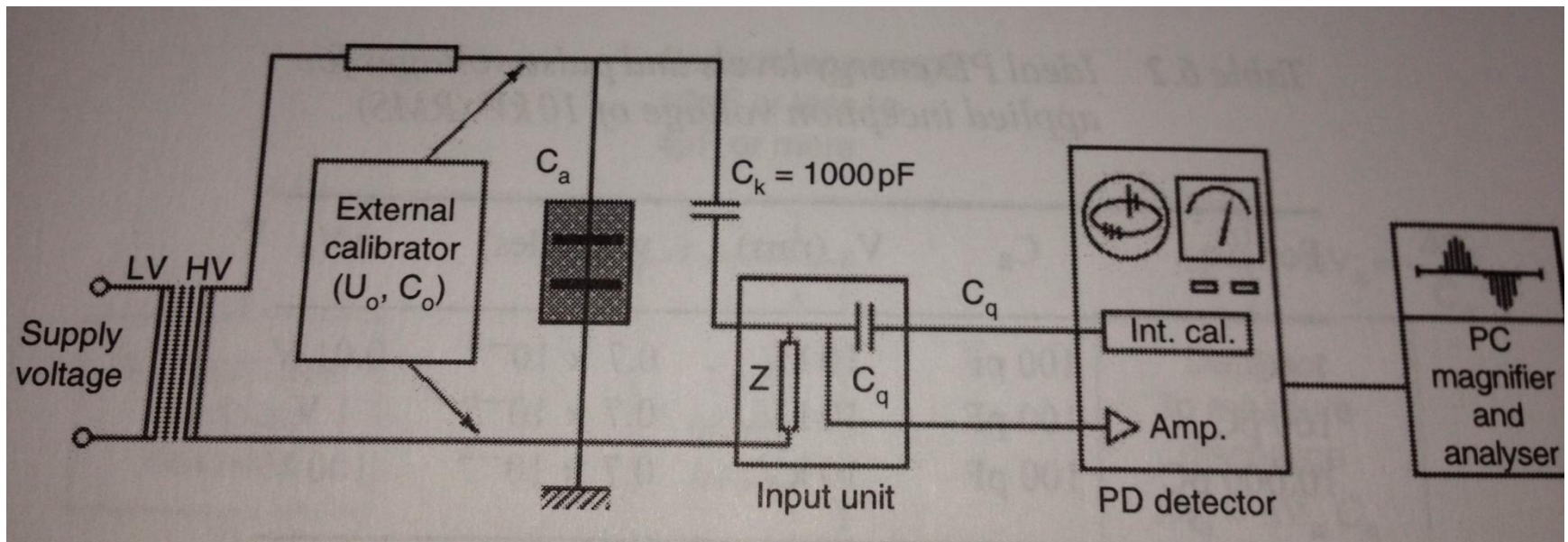


Monitoring of partial discharges

- Steps involved:
 - Detection of discharge
 - Measurements of the discharge quantities
 - Location of the discharge site
 - Evaluation

Typical partial discharge measurement

- High voltage V_n is applied across the insulation system (C_a).
- Short pulse discharged into C_a is measured to estimate partial discharge intensity



Optical partial discharge detection

- This is based on the detection of light produced as a result of various chemical processes like ionization, excitation, recombination during partial discharge process.
- The amount of light emitted and its wavelength depends on the insulation medium and surrounding conditions(temperature, pressure)
- By observing the spectrum of the light emitted, intensity of partial discharge is estimated
- For light tight situations, an optical fiber cable is used to transmit light emitted inside the equipment