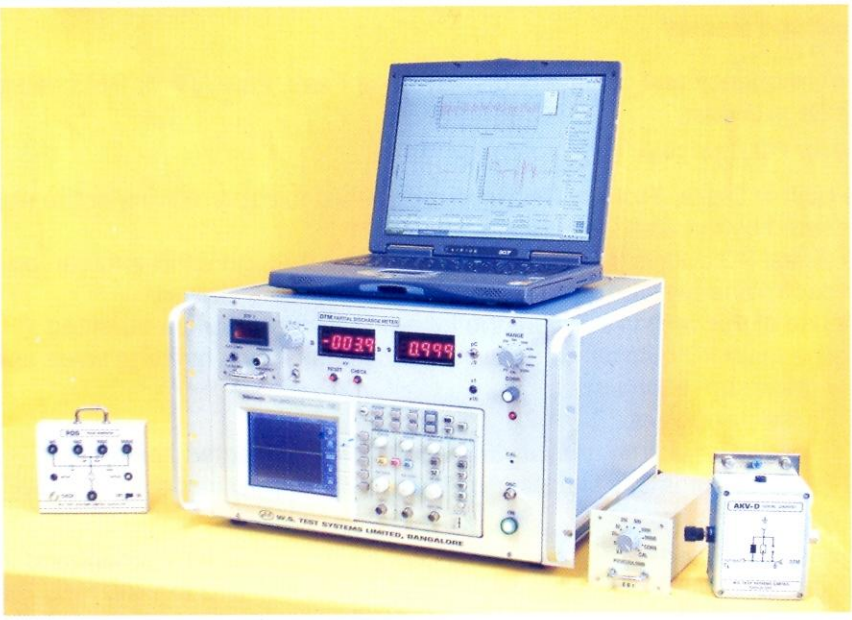
PARTIAL DISCHARGE MEASURING SYSTEM(DTM-D)



1. General

The measurement of partial discharges is a non-destructive test on electrical power apparatus. The measured quantities are valuable data to determine the quality of an insulation. In high-voltage test techniques, special importance is therefore attached to measurement of partial discharges.

The reading of partial discharge intensity is in pico-coulombs (pC) or, alternatively, Radio Interference Voltage (RIV) in microvolts (μV). The High Voltage AC Voltage display is also available to measure peak, peak/$\sqrt{2}$ and RMS using suitable Voltage Divider.

The partial discharge/RIV measuring system consists of,

- Partial discharge meter (Type DTM) which is the basic measuring unit with built-in Digital Storage Oscilloscope.
- Filter insert option for either Narrow band (Type DTF-1) or Broad band (Type Eb1)
- Measuring impedance and coaxial connecting cable.
- Pulse generator (Type PDG)
- Laptop Computer

Functions:

- Measurement of partial discharges in pC and RIV in μV.
- Measurement of number of pulses above threshhold and details of its phase position.
- Narrow band selective filter (Type DTF1) with variable center frequency from 600 kHz to 2400 kHz, band width 9kHz for PD and RIV measurements. Alternatively, Broad band filter insert with frequency range from 40kHz to 220 kHz having fixed bandwidth of 180kHz for PD measurement.
- Built-in oscilloscope to display PD pulses.
- Facility to measure high voltage AC as Peak, Peak /$\sqrt{2}$ or RMS Values.
- Software for recording and further processing of PD pulses in Computer.

2. MEASURING PRINCIPLE

Partial discharges in the test object cause charge transfers in the high-voltage circuit, giving rise to voltage pulse variations on the measuring impedance (Quadripole). These pulses are evaluated by the partial discharge meter. The filter with adjustable centre frequency allows to select parts of the high-voltage spectrum for measurement purposes.

3. DESCRIPTION

3.1 Partial discharge meter (DTM D)

The measured partial discharge intensity is displayed either in pC or in μV in accordance with IEC60270 / IS 6209 or NEMA 107. According to IEC60270, the measured quantity shall be multiplied by a correction factor, which takes care of the circuit characteristics of the complete test arrangement. With built-in correction circuit, it is possible to incorporate the correction factor into the display. The actual partial discharge intensity can then be read directly without the usual calculations. At switch position "CORR", the correction factor is displayed directly. The PD pulses are tapped from the analogue output terminal and displayed on the built-in Digital Storage Oscilloscope.

3.2 AC Test voltage display

The power frequency test voltage is displayed as Peak, Peak/$\sqrt{2}$ or RMS values in conjunction with suitable voltage divider.

3.3 Software for PD Analysis

- ➢ The built-in Digital Storage Oscilloscope is used to capture/transfer the Analog PD pulses measured by the basic PD Meter (clause 3.1)
- ➢ The digital PD data is transferred to a Laptop computer and can be manipulated using Microsoft Windows compatible software loaded in the Laptop.
- ➢ With use of this built-in software the following features can be obtained :
  - The main PD display window shows the peak value, average value and the number of pulses above threshold.
  - Phase position of PD activity.
  - Provides noise immunity used to cancel-out unwanted noise.
  - Provides automatic statistical data analysis for post inspection review.

3.4 Filter inserts :

A selective Narrow Band filter with variable center frequency and a broadband filter can be supplied.
Narrow Band filter : Variable center frequencies from 600 kHz to 2400 kHz, Bandwidth 9 kHz
Broad-band filter : Frequency range 40 kHz to 220 kHz, Bandwidth 180 kHz.
The basic noise level of the instrument is less than 0.6 pC in the most sensitive measuring range.
The measuring accuracy and linearity correspond to IEC 60270 and IS 6209
Measuring ranges:
2.5pC to 50,000 pC (IEC 60270) / 1 μV to 25,000 μV (VDE, CISPR)

3.5 Measuring impedance :

The measuring impedance (quadripole) filters out the power frequency currents from the high-voltage test circuit and allows only HF PD pulses. It can be continuously loaded with 4 A. Built-in surge arresters protect the instrument against over voltages.

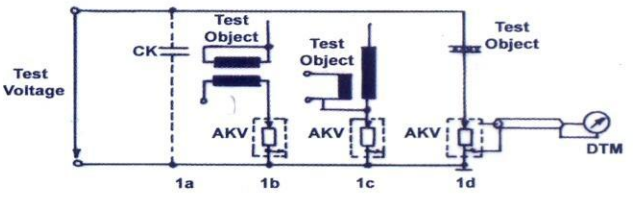
4 Computer : Laptop PC

5 Cable : Co-axial cables to connect quadripoles to meter.

6 Dimentions and Weight (PD Meter) : 19" RACK (6 units of height), 40 kg.

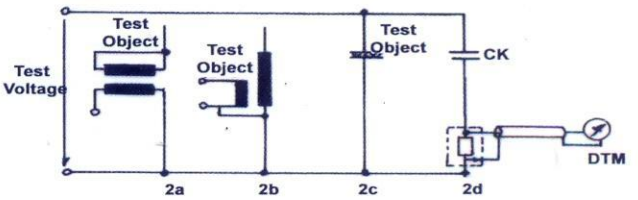
7 DTM-Test Circuits

Fig.1. Connection of partial discharge meter DTM between test object an ground (Test circuit according to IEC60270 and IS6209).



1a. A coupling capacitor may be used to improve the transfer characteristics of the test circuit
1b. PD measurement during applied potential test of inductive test objects.
1c. PD measurement during induced potential test of inductive test objects.
1d. PD measurement on capacitive test objects.

Fig. 2. Connection of partial discharge meter DTM between coupling capacitor and ground (Test circuit according to NEMA Publ. 107)



2a. PD measurement during applied potential test of inductive test objects.
2b. PD measurement during induced potential test of inductive test objects.
2c. PD measurement on capacative test objects
2d. Coupling capacitor (C = 1000 pF) according to NEMA Publ. 107

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