PARTIAL DISCHARGE METER (DTM)

* Measurement of Partial Diascharges in pC and μV.
* Variable selective filter, 600 kHz to 2400 kHz

1. GENERAL

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

The reading of the partial discharge intensity is in picocoulombs (pC) or alternatively in microvolts (μV).

A complete partial discharge measuring equipments consists of :
- Partial discharge meter DTM with filter insert
- Measuring impedance and coaxial connecting cable

2. MEASURING PRINCIPLE

Partial discharge in or on the test object cause charge transfers in the high-voltage circuit, giving rise to voltage pulse variation on the measuring Impedance (quadripole). These are evaluated by the partial discharge meter.
The filter with adjustable center Frequency allows to select parts of the high-voltage spectre for measurement purpose.

3. DESCRIPTION

3.1. PARTIAL DISCHARGE METER (TYPE:DTM)

The measured partial discharge intensity either in pC or μV in accordance with IEC60270 or VDE 0434 and VDE 0876. According to IEC 60270, the measured quantity shall be multiped by a correction factor, which considers the circuit characteristics of the complete test arrangement. With the built-in correction circuit it is poooible to incorporate correction factor into the display. The actual partial discharge intensity can then be read directly without the usual calculations.In position "CORR", the correction factor is displayed also directly.
An analogue output terminal is provided for the display of the partial discharge pulses on an oscilloscope.

An internal calibration voltage allows to verify proper performance of the instruments in position "CAL".

3.2. FILTER INSERTS

For PD Meter (DTM),a selective filter with variable canter frequency and broadband filter can be supplied.

- Selective filter :

Variable center frequencies	= 0.6...2.4MHz
Bandwidth	= 9 kHz

-Broad-band filter :

Bandwidth	= 40 kHz ... 220 kHz

The basic noise level of the instruments is less than 0.5 pC in the most sensitive measuring range. The measuring accuracy and linearity correspond to VDE 0876 and IEC 60270.
Measuring Ranges :
2 pC to 50,000 pC (IEC 270)
1 μV to 25,000 pV (VDE, CISPER, NEMA)

3.3. MEASURING-IMPEDANCE(TYPE:AKV-D/AKU-DU)

The measuring impedance (quadripole) filters the HF voltage portion from the test circuit. It can continuously loaded with 4 A. It has built-in surge protector which protect the instrument from over voltages.

4. DIMENSIONS AND WEIGHT

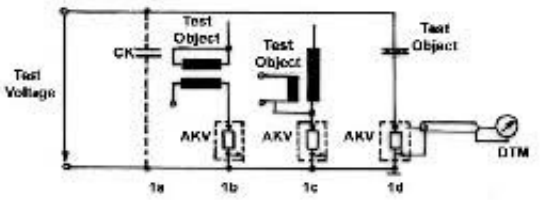
206 mm wide X 177 mm high X 245 mm deep
(1/2-19" plug-in unit)
Weight : approx 5 kg

5. ACCESSORY

Housing, in case the instruments is not intented for rack-mounting

6. DTM - TEST CIRCUITS

Fig. 1 Connection of partial discharge meter DTM between test object and ground (Test circuit according to IEC Publ. 270 and VDE 0434.



1a. A coupling capacitor may be used to improve the tranfer characteristics of the test circuit

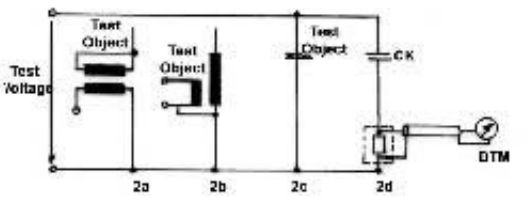
1b. PD measurement during applied potential test of inductive test objects

1c. PD measurement during induced potential test of inductive test objects

1d. PD measurement on capacitive test objects

CK = Coupling capacitor
AKV = Measuring impedanc

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 capacitive test objects

2d. Coupling capacitor (C = 1000 pF measurements according to NEMA Publ.107)

PULSE GENERATOR (PDG)

1. GENERAL

The quantities measured in partial discharge tests must be multiped with a correction factor in order that test results obtained from a specific test object will be reproducible in different test circuits. This correction factor must allow for the circuit characteristics.
The pulse generator PDG has been designed to produce uniform and reproducible pulses by which the correction factor can be determined as under ;

Correction factor $K = \frac{C_x + C_a}{C_x}$

Where
C_x is the test object capacitance
C_a is the sum of all capacitance in the high voltage circuit (internal capacitance of test transformer, capacitance of the measuring capacitor and stray capacitance to ground)

2. DESCRIPTION

The battery-operated pulsegenerator PDG produces pulses of constant amplitude and constant electrical charging content. These pulses appear at a repetition frequency equal to twice the mains frequency.

A photocell in the pulse generator is excited by the lighting equipment and synchronizes the repetition frequency of the generated pulses. It is, therefore, important that the pulse generator is position such that light from artifical sources will strike the photocell. The battery charge is indicated with an LED when the button "CHECK" is pressed.
The following output terminals are provided :
5-50-500-50000 pC.

The impulse front time is approx. 50 nS.

3.MEASURING PRICIPLE

For partial discharge measurements according to IEC publ. 60270 with partial discharge meter DTM, the pulse generator is connected to the deenergised test circuit in parallel with the test object (Fig.1). Care should be taken to use the shorteet possible leads.
The correctiona factor shall be determined according to Fig. 2 if
a) another type of partial discharge meter is used
b) the correction factor shall be determined according to VDE 0434.

4. DIMENSIONS AND WEIGHT

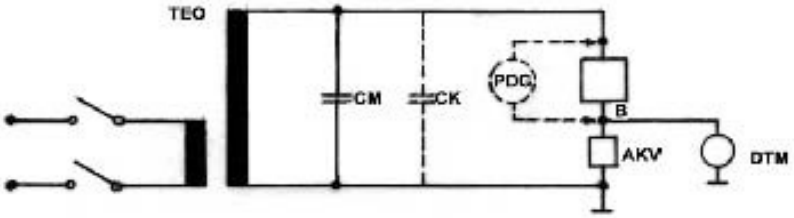
30 X 130 X 110 mm
650 grams

5. ACCESSORY

9 Volt battery.

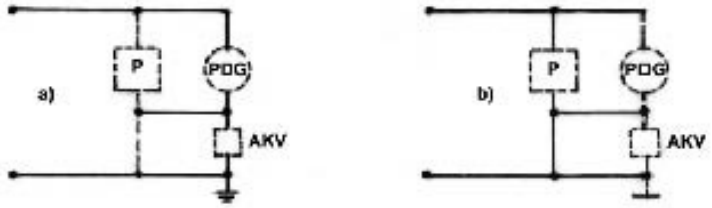
6. Measuring circuits

Fig. 1
Determination of the correction factor for partial discharge measurement



Connection of PDG between "A" and "B" (50 pC terminal)
Switch on filter of TEM or DTM to "CORR"
Direct reading of correction factor on "CORR" scale

Fig. 2
Determination of the correction factor for partial discharge measurement acc. to VDE 0434.



a) Connection of PDG to define a_1
b) Connection of PDG to define a_2

Determination of corection factor : $\frac{a_1}{a_2}$

TEO	**= Test transformer**
CM	**= Measuring capacitor**
CK	**= 1000 pF Coupling capacitor**
P	**= Test object**
TEM 77	**= Partial discharge meter**
DTM	**= Partial discharge meter**
AKV	**= Coupling quadripole**
PDG	**= Pulse generator**