

# Partial Discharge Test on Power Capacitors 208

## Problem

Partial discharge (PD) measurements on power capacitors can be very difficult. Power capacitors are typically characterized by capacitances ranging from 1  $\mu\text{F}$  to several hundreds of  $\mu\text{F}$ .

High capacitance of the test object reduces the PD measurement sensitivity and drives-up the test current requirement from few to several hundreds of amperes. Furthermore, coupling capacitors in the  $\mu\text{F}$  range are not available in the market.

The internal self-inductance (L) and the resistance (R) of the power capacitors additionally impacts adversely on the measurement sensitivity and impose restrictions on the measurement frequency to use for PD measurements.

## Solution

The recommended test arrangement for power capacitors is shown in Fig. 2.

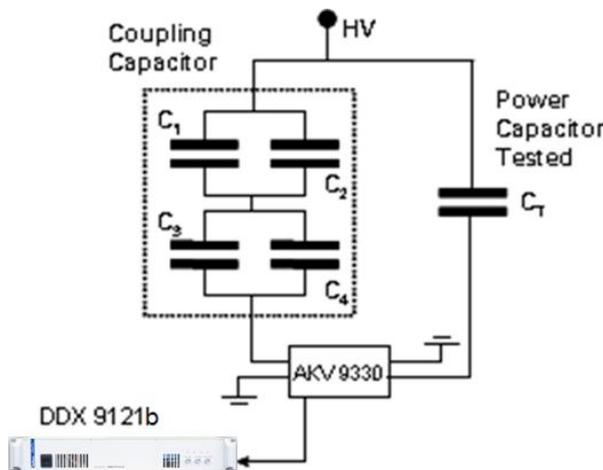


Fig 2. PD Measurement Circuit for Power Capacitors

by the Tettex PD coupler – AKV 9330, specially designed for PD testing of power capacitors. The unique characteristic of this coupler is that it amplifies the high frequency PD pulse currents (typically in nano-amperes) by an amplification factor unmatched in the industry and achieved without adding any significant impedance to the PD pulse transit path. Other notable features of Tettex AKV 9330 is that its working frequency range is 100% within the PD measurement frequency bandwidth recommended in IEC 60270 standard on partial discharge measurements and the maximum test current of the coupler is 300 amps.

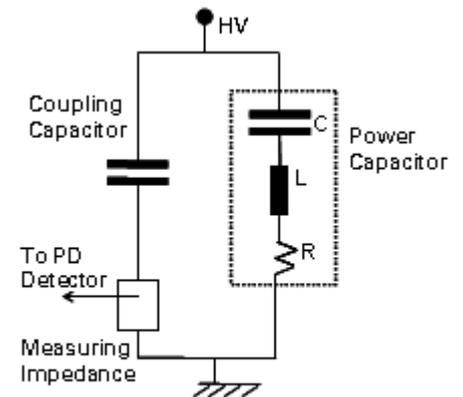


Fig 1. Classical PD Measurement Circuit

The coupling capacitor is formed by using four capacitors (C1-C4) identical to the test specimen and connected in such a manner that at full test voltage the voltage across any one of the individual capacitors (C1-C4) is only one-half of the voltage applied across the test specimen. Assuming that at 50% of the test voltage, the capacitors (C1-C4) are discharge free; this test arrangement provides a practical and cost-effective solution to PD testing needs of power capacitors.

The principal stumbling block to get the maximum PD sensitivity out from a test arrangement that inherently limits the PD measurement sensitivity has been solved

The additional advantage of the test connection, shown in Fig.2, is the reduction of common-mode interferences signals, which gives an additional boost to the PD measurement sensitivity.

## Required Test Equipment

DDX 9121b



AKV 9330



KAL 9510/9520



## Recommended Test Accessories

Resonant Test System



Frequency Response Analyzer (FRA 5310)



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