CDA PARTIAL DISCHARGE DIAGNOSIS SYSTEM

CDA-50

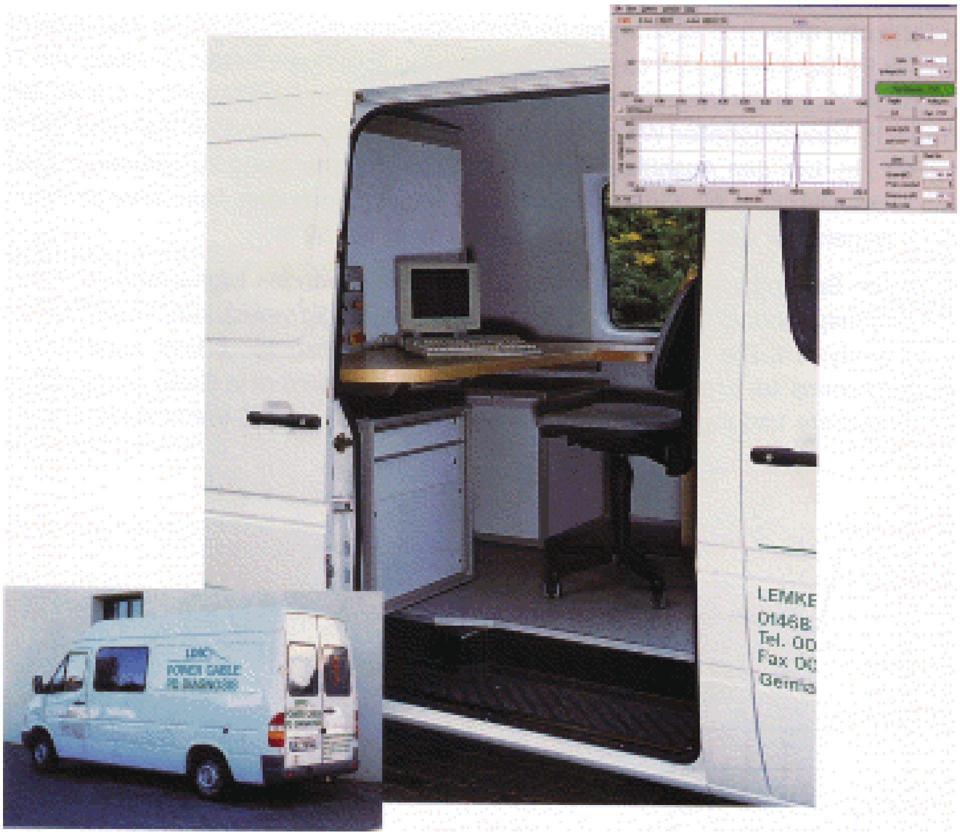

Fig. 1: View of the measuring and control modul of the CDA test facility, installed in a cable test van

Field of application

The CDA-50 is designed for non-destructive quality tests of medium-voltage power cables and their accessories, such as joints and terminations, subjected to a transient voltage stress of specified shape. First the cable capacity is charged slowly and after that discharged much faster. During this discharging time period a complex analysis of the PD events is performed (**C**omplex **D**ischarge **A**nalysis = **CDA**). This innovative diagnosis procedure avoids any unnecessary overstressing of the cable insulation, because a test level not higher than 2 * U_0 and a low number of test shots is sufficient for the indication of dangerous PD faults. Consequently, the ignition of new dielectric defects by applying the CDA voltage may not appear.

The test procedure is automatically controlled by the computer and the PD fault location is determined online during the CDA test. For analysis the digitized and stored test data as well as for postprocessing of dangerous PD faults an user-friendly evaluation program is available.

The CDA test facility can be installed easily in cable test vans (Fig. 1), because of the low wight and the modular design. Due to the low power demand of less than 2 kVA on-site tests can be performed independently from the mains, if supplied via a low-cost motor generator.

Function description

The transient CDA test voltage consist of two typical time intervals (Fig. 2a). The front time t_1 lies in the second-range. Hence, it is comparable to the cycle duration of a very low frequency (VLF) voltage of 0.1 Hz. So the power demand for charging the cable capacity becomes extremely low. In difference the tail time t_2 ranges around 10 milliseconds, which is comparable to the half cycle duration of the power frequency voltage of 50/60 Hz. Due to this fast voltage changing the physical conditions for ignition of PD events are much better than in the case of the slowly changing voltage during the front time t_1. Consequently, the PD detection is performed in the tail region t_2, when the the cable capacity is discharged (Fig. 2b). In order to increase the efficiency in generation the test voltage, the cable is discharged via an inductive coil. Due to the resulting oscillations the test voltage level U_T is increased effectively up to 50 % or more if compared to the charging voltage magnitude U_C.

At each CDA test shot the signals of interest, as the discharging voltage, the apparent charge of the PD pulses as well as the wide-band amplified origin PD pulses, are digitized, stored and analysed. Dangerous insulation defects are located automatically, based on the PD location program. The test results are summarized in a printed diagram, which indicates the scattering of the apparent charge magnitudes and the repetition rate versus the cable length, where the PD events appeared.

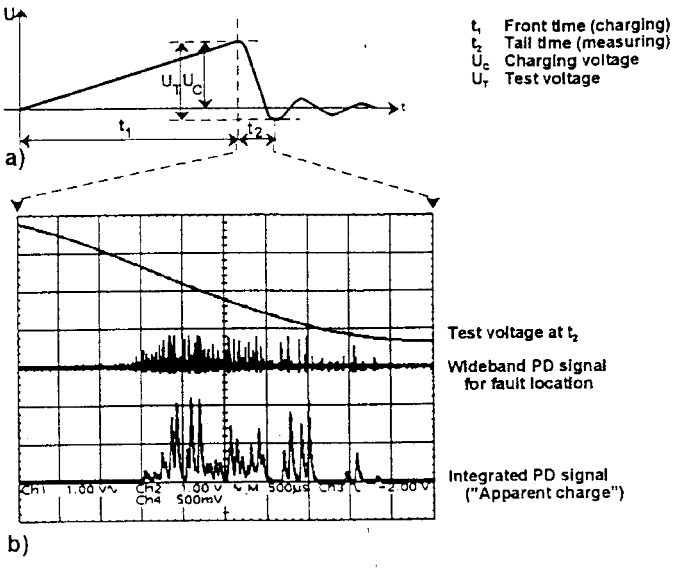

Fig. 2: Shape of the CDA test voltage (a) and recorded signals (b) which refers to the tail time t_2

Specification

Max. charging voltage magnitude	U_C = 50 kV
Max. discharging voltage magnitude	U_T = 85 kV
Max. power consumption	P_a < 2 kVA

Preliminary test parameters

Max. test level	U_t = 2 * U_0
Number of shots	N = 10
Polarity of the discharging voltage	positive or alternating

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