

Instruments

Power Diagnostix Systems GmbH produces versatile, top-quality instruments for high-voltage diagnostic applications. Power Diagnostix ICMseries of partial discharge detectors is used worldwide for evaluation of electrical insulation used in electricity generation, transmission and distribution, in manufacturing, in research, and in industry. In addition to partial discharge detection equipment, Power Diagnostix produces instruments for fiber optic transmission, GIS fault location, $\tan \delta$ measurements, and high-voltage test control.

ICMsystem 5

The ICMsystem is a digital partial discharge detection system suitable for a wide range of applications. The instrument is completely controlled by software using a GPIB or TCP/IP, GMS, Modem, fibre optic or direct serial link.



ICMsys8 7



The ICMsys8 offers all features of the ICMsystem, but with true parallel 8 channel acquisition. The ICMsys8 provides the most user control of data acquisition parameters and the highest functionality. It is designed for acceptance tests on large power transformer.

ICMcompact 9

The ICMcompact is a stand-alone partial discharge detector often used for quality assurance and quality control tests of insulation, and can be connected to a PC for data storage. Among other options, the ICMcompact can be equipped with circuits to perform partial discharge location in power cables.



AIAcompact 11

The AIAcompact is a portable unit for acoustic partial discharge measurement on GIS, transformers, and cable accessories. Optionally, the unit can be equipped with battery operation, wireless synchronization, and circuits for UHF measurements on embedded or external UHF sensors.

ICMmonitor 13

The ICMmonitor is an instrument for continuous on-line monitoring of partial discharge activity in high voltage equipment. The instrument tracks changes in key discharge quantities for storage in trending diagrams and for triggering user-settable alarms. TCP/IP, Modem, fiber optic or direct serial links enable remote access and full remote control.



TDAcompact 15

The *TDAcompact* is a loss factor meter. The capacitance C_x , the $\tan \delta$, and the voltage are derived by digitally processing the current of the test capacitor and the current of a normal capacitor, which are sampled simultaneously. A serial interface offers connection to a PC and embedding the *TDAcompact* into automated test systems.



HVcompact 17

The *HVcompact* is a high voltage meter with an auto-ranging oscilloscope display of the voltage waveform. The unit displays U , $\hat{U}/\sqrt{2}$, U_{rms} , frequency, and crest factor. To protect test specimens, the unit offers a pre-settable voltage limit, which trips a relay output. The divider ratio is widely adjustable and is kept with a non-volatile memory.



STEPcompact 19

The *STEPcompact* allows running high voltage test sequences. The instrument controls via fiber optic cable the 'UP' and 'DOWN' contact of the motor driven voltage regulator (VARIAC). The voltage measurement functionality is similar to the *HVcompact*. The instrument detects incipient breakdown and keeps a record of the test sequence.



HVcontrol 21

The *HVcontrol* offers all features that are required to manually control any high voltage test set. Piezo-electric buttons control the functions of the unit, while the bicolor illumination of each button indicates the current state of this function. Three digital displays indicate the values of primary and secondary current as well as of the primary voltage. Current limits that trip the main circuit breaker can be set for both I_{prim} and I_{sec} .



FOsystem 23

The FOsystem is a complete set of instruments for convenient fiber optic transmission of analog signals from different sensors (e.g. temperature, pressure, acoustic, voltage, current). The signal bandwidth covers DC up to 10MHz.



ATTAnalyzer 25

The ATTAnalyzer supports commissioning of gas-insulated switchgear yards. Signals of up to 16 acoustic sensors are connected by means of fiber optic cables to the instrument. Precise localization of breakdown within the GIS is provided by comparing the travel-time of the breakdown sound to the various sensors.

Accessories

Preamplifiers (RPA) 27

Preamplifiers serve to condition, filter, and amplify the partial discharge (PD) signal to be measured. Because the frequency range in which PD signals are measured is strongly dependent on the preamplifier used, proper selection of a preamplifier is an important part of noise mitigation and can have a strong effect on the appearance of the PD pattern itself.



Coupling Devices (CC, CT) 29

In standard laboratory configurations coupling capacitors with built-in quadrupoles are conveniently used to capture the partial discharge signals and to synchronize the measurement to the test frequency. Additionally, rugged coupling capacitors are used for permanent installation for monitoring purpose.

Quadrupole & Isolation Transformer 31

When a quadrupole and a coupling capacitor are used together as the coupling device, high voltage is applied both to a test object and to the coupling capacitor in parallel with the test object. A quadrupole (sometimes called a measuring impedance) can then be placed in series with either the coupling capacitor or in series with the test object.



Sensors and Miscellaneous 33

Besides the standard coupling units used as well on rotating machines and metal-clad switchgear, Power Diagnostix offer various sensors for temporary or permanent installation with gas-insulated switchgear (GIS), cable accessories (joints, terminations), and power transformers, for instance. Such sensors perfectly match with the line of pre-amplifiers of the ICMseries. For existing measurement taps of transformer bushings a series of bushing adapters is offered.



Calibrator (CAL) 35



Partial discharge measurements are relative measurements. Thus, calibration generators offering impulses with know charge magnitude serve to calibrate the measurements. Depending on the different applications, Power Diagnostix offers a variety of calibrators ranging from 1pC to 50nC. Due to their high bandwidth the calibrators are suitable for impulse reflectometry on cable systems and for GIS testing (CAL2x). New calibrators are shipped with the DKD calibration certificate to ensure the traceability to international standards.

Application 37

Using the range of instruments with the different applications, such as rotating machines, power transformers, cable systems, or GIS and GIL, strongly requires considering the special conditions of each field. For on-line application, the adequate handling of the noise interference, the proper choice of the coupling method as well as the frequency range and, hence, the used pre-amplifiers, are important steps to an optimized partial discharge measurement. More recently, with increasing switching speed, partial discharge testing of 'lower voltage' components became more important as well.



Pattern 41

With the partial discharge pattern (ϕ -q-n pattern), each acquired impulse is sorted and counted with respect to its phase angle and acquired amplitude. The resulting partial discharge pattern contains information of various properties of the defect causing the discharge. This includes information concerning the geometry of the defect, its symmetry, the properties of the contributing surfaces, the material, and the gas, for instance. Besides this, the temperature and the pressure of the gas as well as ionizing irradiation influence the appearance of such partial discharge pattern.

