

# Electrical Insulation Diagnostic System **PDC-ANALYSER-1MOD**



The **PDC-ANALYSER-1MOD** (Polarisation Depolarisation Current) is an instrument for on-site measuring and analysing the dielectric behaviour of electrical insulation materials and insulation systems. It combines a windows compatible computer, a wide range electrometer with special filtering properties, an adjustable voltage source, switching devices, measuring and analysis software in one portable, rugged case. It can be used in high-voltage substations as well as in laboratory and industrial environments.

## Features

- Automatic data acquisition of polarisation and depolarisation currents over duration up to 200'000 s with a sensitivity of  $10^{-12}$  A (however, a typical measurement takes between 2'000 and 10'000 s)
- Adjustable voltage source up to 2'000 volts
- Measured time domain data can be converted into frequency domain data resulting in a continuous dielectric spectroscopy (capacitance and dissipation/loss factor) from 1 Hz down to less than 0.0001 Hz
- Evaluation of diverse kinds of "polarisation indexes", "return voltages" and "polarisation spectra"
- Evaluation of the ageing state and of the moisture content of especially oil-paper insulation systems
- Ongoing measurements can be viewed real-time on large color screen

## Applications

- Non-destructive diagnosis of electrical insulation systems: all kinds of power transformers, bushings, power cables of any design, generators, motors
- Material testing
- Production control
- Documentation of insulation properties of new high voltage equipment for anticipated comparison purposes. This can be helpful for making maintenance and end of life decisions

## Insulation Analysis and Diagnosis

All kinds of insulation materials undergo degradation processes or ageing effects, if stressed by electric fields, partial discharges, temperature and mechanical forces. These ageing effects change the dielectric properties (real and imaginary part of the permittivity) which can be identified either by the measurement of the "dielectric response function" in the time domain (also called "time domain spectroscopy") or by measurements of the capacitance and the losses in the frequency domain ("frequency domain spectroscopy"). Application of these methods to insulation systems of high-voltage equipment

is extremely valuable as the results provide answers about the actual conditions and the status of the insulation. As the results from each measurement method can be transformed mathematically into equivalent results of the other method, the **PDC-ANALYSER-1MOD** is based on "time domain spectroscopy", which can be made in less time and with better precision than measurements in the very low frequency domain. The **PDC-ANALYSER-1MOD** is thus a most flexible diagnostic tool for insulation systems and insulation materials.

### Specifications: Electrical Insulation Diagnostic System PDC-ANALYSER-1MOD

<b>Current measurement</b>	
range	±1 mA
resolution (current display when measuring)	1 pA
resolution (recorded data)	0.1 pA
accuracy	0.5 % of the measured value ±1 pA after 1 hour warming up
impedance	10 kΩ
protection	up to 100 mA respectively 1 kV for 50 ms
noise suppression	up to 10 µA eff at 50 / 60 Hz mains frequency
filtering (current display when measuring)	mean value in 1 s intervals
filtering (recorded data)	mean value in intervals increasing proportionally with the time from the voltage source switching moment
<b>Voltage source</b>	
voltage range when switched on	+30 ... +2000 V
maximum current sourcing when switched on	<+5 mA
impedance when switched on	< 20 kΩ
impedance when switched to zero	< 0.2 Ω
current limiting when switching cap. loads	< ±100 mA for 20 ms
<b>Capacitance measurement</b>	
the load capacitance is indirectly measured by computing the ratio charge to voltage when the voltage source is switched off for measuring of the depolarisation current. However, the current measurement is not impaired by a load capacitance surpassing the range listed below.	
load capacitance measuring range at 2 kV source voltage	25 nF
accuracy at 2 kV source voltage	±2 % ±5 pF
load capacitance measuring range at 1 kV source voltage	50 nF
accuracy at 1 kV source voltage	±2 % ±10 pF
load capacitance measuring range at 500 V source voltage	100 nF
accuracy at 500 V source voltage	±2 % ±20 pF
load capacitance measuring range at 100 V source voltage	500 nF
accuracy at 100 V source voltage	±2 % ±100 pF
<b>Computer</b>	
display	15" TFT, 262'144 colours, resolution 1024 x 786 pixels
processor	Intel Pentium III 750 MHz
memory	SDRAM 128 MB (up to 256 MB optional)
hard disk	10 GB
standard interfaces	CD-ROM, 3½" Floppy, 2x PCMCIA, parallel and serial ports, Ethernet
options	additional serial ports, Audio in/out, external Monitor out
<b>Software</b>	
operating system	windows 98 SE
measuring and control program	installed ready to use, outputs for each measurement one file with polarisation data, one file with depolarisation data and one file with general measurement descriptions
standard evaluation software	installed ready to use, easy to use, extensive possibilities to postprocess, display, print and export the measured data, computation of the complex capacitance in function of frequency, computation of a lumped equivalent circuit of the measured insulation, computation of recovery voltages and the derived "polarisation spectrum", computation of polarisation indexes and of insulation resistances according to all known standards and definitions
advanced evaluation software	quality assessment of oil-paper insulation systems, quantitative determination of moisture content in pressboard and of oil conductivity for power transformers
<b>Miscellaneous</b>	
weight	17.3 kg
power supply	90 ... 260 V, 47 ... 63 Hz, <160 VA
size	514 × 185 × 428 (width × depth × height in mm)
temperature (use)	0 ... 35 °C
temperature (stock)	-10 ... 50 °C
pressure	70 ... 106 kPa
humidity	5 ... 80 % non condensing
acceleration	< 2 g
length of standard measurement cables	15 m