

TAN DELTA - TDM 4000

Automatic Dielectric Constant Tan Delta & Resistance Bridge

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Benefits

- Fully Automatic Dielectric Constant, Dielectric Dissipation Factor & Resistivity Measurement.
- Inbuilt Printer Facility for Test Report Printing.
- Easy Storage of Data.
- PC Compatibility.
- Fully Automatic Operation
- Data Storage 250 test results in inbuilt memory



Sample Number	Temperature °C	Capacitance F	Dissipation	AC Voltage V	Power, W	Resistance Ohm	DC+ Voltage V
1		200.1p	-0.0032	499.5	-0.005m	1107T	499.9
2		200.1p	0.0600	499.5	0.096m	4613T	499.7

Measuring in process

Resistance	Value	Unit
Resistance	1.036G	Ohm
Voltage	500.3	V

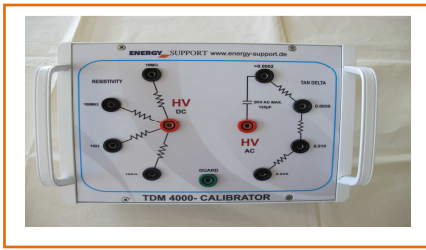
Measurement finished

Parameter	Value	Unit
Capacitance	200.1	pF
Dielectric*	3.564	
Dissipation	0.0605	
Voltage	500.2	V
Current	32.02	uA
Power	0.097	mW
Frequency	50.90	Hz

Measurement finished

The TDM-4000 is an automated instrument for measuring the electrical characteristics of transformer oil, insulating liquids & other insulating material samples. The TDM-4000 measures Capacitance, Dielectric Constant ($\hat{\epsilon}$), Dielectric Loss, Tan Delta (Dissipation Factor), Resistance & Resistivity of the test sample. The Tan Delta value gives an indication of the condition of the oil sample. There are several reasons due to which the Tan Delta value may be affected – such as moisture, dissolving of some of the transformer varnish, insulating material deteriorating etc.

Oil sample dose - Start measuring - The result obtained



TDM-4000 is especially designed to work with the IEC & ASTM type oil cell with a 2mm spacing and will apply a stress in the range of 100 - 1000 volts per mm as recognized by ASTM and other specifications.

DESCRIPTION

The model TDM-4000 is a versatile Test Set used for measuring the Dielectric Constant, Tan Delta (DF), Resistivity of transformer oils & other electrical insulating liquids or solid insulating materials in sheet form. The TDM-4000 is only the measuring instrument to test insulating liquids, it should be used with a three terminal oil test cell. A heater is required if the oil is to be tested at temperatures specified in international or national standards. A suitable solid dielectric test cell is required for testing insulation in sheet form. When excited with an AC source, the TDM-4000 measures the Voltage, Capacitance, Dielectric Loss and Frequency. Dissipation Factor (Tan Delta) or Power Factor is calculated from the above measurements. To determine the Dielectric Constant (ϵ), the measurements are carried on an empty and a full test cell. The parameters of the test cell can also be entered manually, using the keypad. The operating procedure is menu driven & simple. The AC & DC test voltages are set using the front panel keypad. Tests can be programmed for the AC test between 200 to 2500 volts and 100 to 1,000 volts for the DC test. After initial set-up, the oil test cell is filled with the oil test sample & the test procedure is initiated. The test set performs all the selected measurements automatically & the results are displayed on the front panel.

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Oil sample dose - Start measuring - The result obtained

CAPACITANCE TAN DELTA & DIELECTRIC CONSTANT

Test Voltage	: 0 - 3000 VAC in 1 volt steps requirement (or as desired by Customer).
Accuracy	: $\pm 1\%$ of output.
Capacitance	: 0 -1600pF
Accuracy	: $\pm 0.1\%$ of reading, ± 0.1 pF.
Best Resolution	: 0.01 pF
Dielectric Constant	: 1 - 6 when using a typical oil test cell (C=55pF \pm 1pF)
Accuracy	: $\pm 0.1\%$
Resolution	: 0.001
Dissipation factor (DF)	: 0-1.000
Accuracy	: $\pm 1\%$ of reading ± 0.0001 (1×10^{-4})
Resolution	: $1 \times 10e-5$
Dielectric Loss	: 0 - 10.00 watts.
Accuracy	: $\pm 1\%$ of reading, $\pm (10^{-5}$ watts)
Best Resolution	: 0.001 milli watts (10^{-6} watts)
Cell Constant	: Any cell acceptable, oil test cell with 55 pF.

RESISTANCE & RESISTIVITY

Test Voltage	: 100-1000 VDC SETTABLE.
Accuracy	: $\pm 1\%$ of setting.
Resistivity	: 10^9 to 10^{15} Ω cm with a typical test cell of 1000 cm.
Resolution	: 3 Digits
Accuracy	: $\pm 2\%$ of reading at $10^9 - 10^{13}$ Ω cm $\pm 5\%$ of reading at $10^{13} - 10^{14}$ Ω cm $\pm 10\%$ of reading above 10^{14} Ω cm

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CAPACITANCE TAN DELTA & DIELECTRIC CONSTANT

OIL TEST CELL

Construction	: 3 Terminal Configuration.
Cell constant	: 621.5 Nominal
Cell Capacitance	: 55pf 1pF
Cell material	: Stainless steel (SS : 316)
Insulation material	: Teflon (PTFE)
Temperature range	: upto 150° C
Electrode Spacing	: 2 mm
Electrodes Max. applicable Voltage	: 2 KV
Volume of the oil required	: 60 ml. Approximately

OIL TEST CELL HEATER

Power Supply	: 230VAC 10%, 50Hz.
Temperature range	: 150° C
Temperature control	: One set point over the entire range (at 90° C)
Test Temperature	: Adjustable from 20 C (Room Temp.) to 150 C with an accuracy 0.5 % Accuracy of temp. control: 2 C.
Indication	: LCD Panel
Sensing probe	: Solid state (PT-100)
Heating element	: Induction Type Heater.

DISPLAY PRINTER & DATA STORAGE

Display	: Alphanumeric LCD display
Keyboard	: 20 Key keypad providing numeric and soft function entries.
Printer	: Inbuilt dot matrix printer.
PC Compatibility	: RS 232 port
Data Storage	: Capacity upto 100 test results should be stored.

POWER SUPPLY, TEMP & HUMIDITY RANGE

Power Supply	: 230VAC 10%, 50Hz Operating Temp: -10 to 50 C Humidity : Ambient to 90% RH
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STANDARD CALIBRATOR

Capacitance 1 value, Tan Delta 3 value & Resistivity 4 value standard calibrator with traceable calibration certificate operating voltage 500VAC/DC.

CONNECTORS

Suitable HV, LV & Ground Leads, 6 Pin Safety Interlock & 3 Pin Mains chord.

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