

# AUTOMATIC DIELECTRIC CONSTANT TAN DELTA & RESISTIVITY TEST SET



**ADTR-2K PLUS**

The ADTR-2K Plus is an automated instrument for measuring the electrical characteristics of Transformer oil, insulating liquids & other insulating material samples. The ADTR-2K Plus measures Capacitance, Dielectric Constant ( $\epsilon$ ), 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 and temperature. This instrument is intended for laboratory use and normal industrial environment. The instrument is not intended for use in potentially explosive atmosphere.

ADTR-2K Plus is designed to test the Dielectric Constant, Tan Delta and Resistivity on new as well as used Insulation Oils as per the requirements of IEC-60247 / IEC-61620 / IEC-60422, IEEE C57-106 / IS-16086 / IS-6103 / IS-6262 / IS-1866-2000, IS-335-1993, ASTM D-257 / 150, ASTM D-924 / 1169, BS-5737.

## FEATURES

- Reduced heating time with fast heating technology.
- Reduced overall testing time using Auto Drain facility & pre-programmed standards.
- Fully automatic testing sequence controlled by a microprocessor. Pre-programmed test sequences are available.
- 800 X 480 TFT LC Display.
- Optional manual test feature to carryout AC & DC (+/-) testing separately.
- Internal AC voltage source synchronized with line frequency and sinusoidal wave shape.
- Internal DC voltage sources for DC voltage.
- RS232 / USB option for Computer Interface for downloading data or control from a PC.
- USB option to save results into the Pen drive.
- Menu driven software for user friendly operation.
- Can store/ retrieve results up to 10,000 readings.
- Measures Resistivity by applying both polarities DC (+/-) test voltages.
- Open GND and interlock protection for safety of Instrument as well as the operator.
- Highly precise induction heating of the Cell with accurate temperature control.
- Test Cell with three electrodes and teflon rings.
- Oil Test Cell design is according to IEC-60247.
- Solid Test Cell design is according to ASTM-D-257.
- Emptying of the Test Cell possible without dismantling.
- Direct temperature measurement by placing the sensor in the electrode.
- Interfacing of the instrument with PC through ADTR-2K Plus Software (supports windows platform only).

## SPECIFICATIONS

### DIELECTRIC CONSTANT & TAN DELTA

<b>Test Voltage</b>	: 50 - 2,400 V AC in 1 volt steps at line frequency
*Accuracy	: $\pm 1\%$ of output
<b>Capacitance</b>	: 30 to 1600 pF approx
*Accuracy	: $\pm 0.1\%$ of reading $\pm 0.1$ pF
Best Resolution	: 0.01 pF
<b>Dielectric Constant</b>	: 1 to 25 when using a typical Oil Test Cell (C=55 to 60 pF)
*Accuracy	: $\pm 0.1\%$
Resolution	: 0.001
<b>Dissipation Factor (DF)</b>	: 0 - 4.000, 6 digits
*Accuracy	: $\pm 1\%$ of reading $\pm 0.0001$
Best Resolution	: 0.000001 ( $10^{-6}$ )

## SPECIFICATIONS

<b>Dielectric Loss</b>	: 0 - 10.00 watts
*Accuracy	: $\pm 1\%$ of reading $\pm (10^{-5})$
Best Resolution	: 0.001 milli watts ( $10^{-6}$ watts)
<b>Cell Capacitance</b>	: 55 - 60 pF (K=622.1 to 678.7 cm) with air as a dielectric medium
Test Frequency	: 50 / 60 Hz

### RESISTANCE - RESISTIVITY

Test voltage	: 100 - 1000 V DC in 1 volt steps
*Accuracy	: $\pm 1\%$ of setting

### RESISTANCE RANGE & RESOLUTION

Range	: $10 \times 10^6 \Omega$ to $3 \times 10^{13} \Omega$ (10 Mega $\Omega$ - 30 Tera $\Omega$ )
Resolution	: 3 digits
*Accuracy	: 2% from 10 Mega $\Omega$ - 10 Giga $\Omega$ 5% from 10 Giga $\Omega$ - 1 Tera $\Omega$ 10% from 1 Tera $\Omega$ - 10 Tera $\Omega$ 15% from 10 Tera $\Omega$ - 30 Tera $\Omega$

### RESISTIVITY RANGE

Range	: 10,000 Mega $\Omega$ cm - 30,000 Tera $\Omega$ cm or (100 M $\Omega$ -m - 300 T $\Omega$ -m) With Cell Constant K=1000 cm
Resolution	: 3 digits (Resistivity range for Liquid) <sub>2*</sub> (Resistivity range for Solid) <sub>3*</sub>

### POWER SUPPLY

ADTR-2k Plus	: 90-270V, 50/ 60Hz, 48VA
AOCH -06/ AOCH Plus	: 90-270V, 50/ 60Hz, 200VA

### NOTE:

1. Measurement carried @ 50V to 200V AC does not claim any accuracy of Tan Delta for pure insulator.
- 2\*. Resistivity range of liquid is given by the resistance value multiplied with the Cell constant of the measuring Test Cell.  
[Rty=R\*K] Ex: Cair=60.00pF, liquid Cell constant K=(11.3/10-12) x 60pF=678.7cm
- 3\*. Resistivity range of Solid is given by the resistance multiplied by the ratio of surface area of the measurement electrode upon distance between the HV and the measurement electrode. [Ex: Rty=R\*(K) & Solid Cell constant K=A/t; where A=7932.72mm<sup>2</sup> & 't' is average thickness of the specimen in 'mm', Consider 't'=2mm, then K=3966.36mm, similarly K=396.63cm].
4. Accuracy applies over a temperature range of 22°C to 26°C and humidity of <50% RH.

## ADTR-2K PLUS with AOCH-06 & OIL TEST CELL



### OIL TEST CELL

This 3 Terminal Oil Test Cell is designed for routine and Laboratory Tan Delta test on Transformer oils and other electrical insulation liquids. The electrode of the Cell is designed with a spherical bottom which offers more uniform stress on the oil as compared to electrode with tapered end.



### SPECIFICATIONS

Construction	: 3 terminal configuration
Material	: Stainless Steel 316 with Teflon spacers
Cell Capacitance	: 55 - 60 pF
Cell Electrode Spacing	: 2mm
Volume	: 45 ml approx
Dimension	: 90mm x 195mm
Maximum test voltage	: 2.4kV AC & 1kV DC
Weight	: Approx. 2.5 Kgs

### AUTOMATIC OIL TEST CELL HEATER - AOCH-06 WITHOUT OIL DRAIN FACILITY

The Heater is a very compact unit and is used to heat the oil in the Cell to the required temperature. This uses a high frequency induction heater which raises the temperature to 90°C in about 10 to 12 min approximately. A temperature sensing probe is supplied and this senses the temperature and stops heating of the oil once the set temperature is reached. LED is provided to indicate 'heating on'. To ensure safety, the built-in micro switch interlock automatically trips the high voltage when the plexi cover of the heater is raised.



### SPECIFICATIONS

Power Supply	: 230V AC $\pm 10\%$ , 50 Hz OR 110V AC $\pm 10\%$ , 60 Hz, 200VA
Temperature Range	: 20 - 110°C
Accuracy of Temperature Control	: $\pm 0.2^\circ\text{C}$
Dimension	: 280 x 400 x 400mm. (LxBxH)
Weight	: Approx. 5.5Kgs w/o Cell

## ADTR 2K PLUS with Auto Drain Cell AOCH-PLUS



The temperature settings & all other test parameters/ sequences can be entered & controlled from the ADTR-2K Plus Test Set. Other than a Power ON, HV ON & Heater ON indicators, there are no other controls on the AOCH Plus.

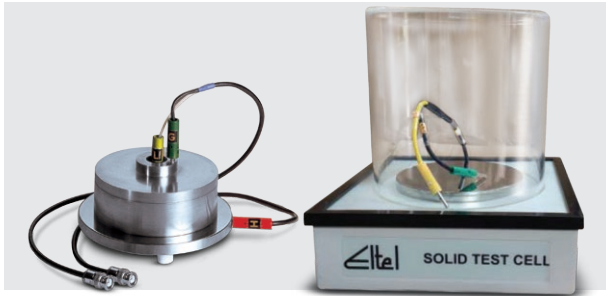


### AOCH-PLUS with Auto Drain

### SPECIFICATIONS

Power Supply	: 230 VAC $\pm 10\%$ , 50 Hz, 215VA or 110 VAC $\pm 10\%$ , 60 Hz, 215VA
Temperature Range	: 20°C - 110°C
Volume of Oil	: 45 ml. approx
Accuracy of Temperature Control	: $\pm 0.2^\circ\text{C}$
Dimensions	: 280 x 400 x 400 mm (LxBxH)
Dimensions with Packing	: 610 x 435 x 635 mm (LxBxH)
Weight	: <20 Kgs with Oil Cell
Packed Weight	: <32 Kgs with Oil Cell

## OPTIONAL ACCESSORIES SOLID DIELECTRIC TEST CELL



The Eltel Solid Test Cell is designed to test electrical insulating material in sheet form using the ADTR-2K test set. The circular electrodes are constructed from rigid stainless steel & will accept samples with a minimum of 120mm in diameter.

The Sample Should be Square with a minimum of 120mm x 120mm (WxB) and a maximum height of 2.5mm or a disc with 120mm minimum diameter and height of 2.5mm. The samples can be tested only at room temperature.

### SPECIFICATIONS

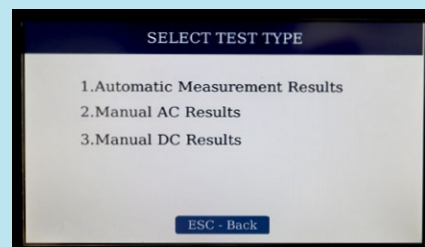
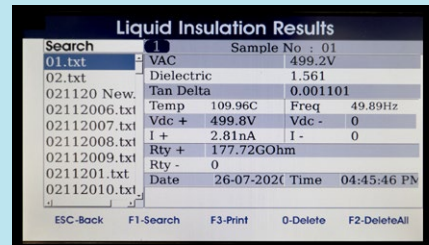
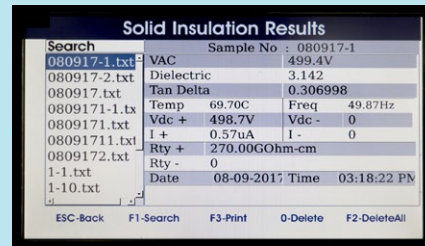
Cell type & construction	: Three terminal, guarded; Stainless Steel
Cell gap spacing	: 0.1mm to 2.5mm
Electrode diameter	: 100mm
Cell Capacitance	: 70pF at 1mm gap
Maximum test voltage	: 2.4kV AC & 1kV DC
Weight	: Approx. 5Kgs

## C-DF & RESISTANCE STANDARD



This standard box is used to routinely check and inspect the Test Set. This offers one Capacitance, three Tan Delta & four Resistance values. The maximum operating voltage is 500V AC for C- DF & 500V DC for Resistance.

## SAMPLE INSTRUMENT SCREENS



## OTHER PRODUCTS

- Manual & Automatic Transformer Ratio Meters.
- Digital Micro Ohm Meters with built-in 100Amp source.
- Manual & Automatic Transformer Winding Resistance & On Load Tap Changer Test sets.
- Automatic CT/ VT Test Sets & Systems.
- Automatic 12 kV & 5 kV Capacitance & Tan Delta Test Sets.
- Relaying Current Transformer Analyser.



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**Eltel Industries – Calibration Laboratory (including on-site calibrations) is NABL-ACCREDITED in electro-technical discipline in accordance to ISO/ IEC:17025/2005.**

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(Specifications subject to change without notice)