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 (\(\varepsilon\)), 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.

ADTR-2K Plus 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 100-1200 volts per mm as recognised by ASTM and other specifications.
**FEATURES**

- Fully automatic testing sequence controlled by a microprocessor.
- Optional manual test feature to carry out AC & DC testing separately.
- Automatic and continuous calibration of resistance measuring circuit against highly stable regulated voltage sources.
- Automatic and continuous calibration of the C & DF measurement against internal reference capacitor.
- Internal AC voltage source synchronized with line frequency and sinusoidal wave shape.
- Internal DC voltage sources for DC voltage.
- Windows software for interfacing to a PC.
- RS232 Computer interface for downloading data or control from a PC.
- USB Serial printer interface for direct test data printout.
- Menu driven software for user friendly operation.
- Can Store/retrieve results up to 1 lakh readings.
- Measures Resistivity by applying DC test voltage.
- Open GND and Interlock protection for safety of Instrument as well as the operator.

**BENEFITS**

- Eliminates manual balancing & reduces operator error.
- Reduces the time required for each test sample.
- Provides a high degree of repeatability.
- Provides a printout, storage or export of test data.

**DESCRIPTION**

The Eltel Model ADTR-2K Plus 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 ADTR-2K Plus cannot be used as a standalone equipment and should be used with 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 solid insulation materials in sheet form.

When excited with an AC source, the ADTR-2K Plus measures the Voltage, Capacitance, Dielectric Loss and Frequency. Dissipation Factor (Tan Delta) is calculated from the above measurements. To determine the Dielectric Constant, 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 2400 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. The test results can be transferred to a PC using the RS232 interface, printed using the USB Serial port, or stored in a non-volatile memory. The tests can also be repeated.

The Temp setting for the Oil Cell Heater should be entered in the Model ADTR-2K Plus front panel. There is a separate option provided to test solid cell in automatic mode which provides reading after a stabilization period of 1 min.

The ADTR-2K Plus automatically turns ON the Heater. We can enter upto a max of 4 Temperatures values (any 4 temp values - in ascending order from 21 deg C to 110 deg C) in the ADTR-2K Plus. Once the testing is initiated, heating is commenced until the first set temp is reached; then the heating is automatically cut-off, and measurements are carried out. Then the Heater is automatically turned ON for the next set value and measurements are carried out. This process is repeated until the last temp is reached and measurements are carried out. The final result (Epsilon, Tan Delta and Resistivity) are all displayed for all the Set temperatures.

The ADTR-2K Plus is housed in 3 U chassis. The temperature is displayed on the LCD display of the ADTR-2K Plus Test Set.

This Instrument is intended for laboratory use and normal Industrial Environment.

This Instrument is not intended for use in potentially EXPLOSIVE atmosphere.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>DIELECTRIC CONSTANT &amp; TAN DELTA</th>
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<tr>
<td><strong>Test Voltage</strong></td>
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<td><strong>Accuracy</strong></td>
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<td><strong>Capacitance</strong></td>
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<tr>
<td><strong>Accuracy</strong></td>
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<td><strong>Best Resolution</strong></td>
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<tr>
<td><strong>Dielectric Constant</strong></td>
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<td><strong>Dissipation Factor (DF)</strong></td>
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<td><strong>Best Resolution</strong></td>
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**MEASUREMENTS**

**Manual Measurements**
Separate and continuous measurements of C, DF and Resistivity can be made at a selected voltage.

**Automated Measurements**
The test set will conduct one set of C, DF and Resistivity Measurements automatically and display the results.

**Display**
800 X 480 TFT panel.

**Keyboard**
20-key Keypad providing numeric and soft-function entries.

**OUTPUTS**
RS-232 Serial Port
Opto-isolated serial port for controlling the instrument from a PC and for outputting data to a PC.

USB Port
Opto-isolated serial port for USB/centronics compatible printer.

**Data Storage**
Capacity – upto 1,00,000 test results can be stored.

**CONNECTIONS**
Test voltage (HV)
- Amphenol MVH connector.

Measuring Terminal (LV)
- BNC connector.

Ground (GND)
- Ground Stud.

Control
- 5 pin Audio connector.

Power connection
- IEC three terminal socket.

**POWER**
- 90 – 260 volts, 50/60Hz, 50VA.

**TECHNICAL SPECIFICATIONS**

Ingress Protection : IPxx.

Measurement Category : 2.

Class : I.

Physical Size (LxBxH) : 482.5 mm x 425 mm x 132.5 mm.

Weight : Approx. 11 kgs.

Temperature Range : -10º to 50ºC (storage temperature).

Humidity : Ambient to 90%, RH.

*Accuracy applies over a temp range of 22º C to 28º C and humidity of <50% RH.

**MEASUREMENTS**

**Required Accessories**

**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 | 50 - 70 pF. |
| Cell Electrode Spacing | 2mm. |
| Volume | 60ml. |
| Dimension | 90mm x 195mm. |
| Maximum test voltage | 2.4 kVAC & 1 kV DC. |
| Weight | Approx. 2.5 Kgs. |

**Automatic Oil Test Cell Heater - AOCH-06**
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 90ºC in about 20 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 | 230VAC ± 10%, 50 Hz OR 110VAC± 10%, 60 Hz, 200 VA. |
| Temperature Range | -10º to 50ºC (storage temperature). |
| Temperature Control | ± 0.5ºC. |
| Dimension | 230mm x 258mm x 314mm. |
| Weight | Approx. 5.5Kg w/o 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 (WxH) and a maximum height of 2.5mm or a disc with 120mm minimum dia 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**: 2.4 kV 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 Resistivity values. The maximum operating voltage is 500V AC or DC.

**OTHER PRODUCTS**

- Digital Micro Ohm Meters with built in 100Amp source.
- Automatic CT/VT Test Sets & Systems.
- Automatic 12 kV & 5 kV Capacitance & Tan Delta Test Sets.
- Transformer Loss Measurement System.
- Relaying Current Transformer Analyser.

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Eltel Industries, established in 1983, is a market leader in the development and manufacturing of test instruments for electrical power industries and utilities. We are pleased to announce the NABL-accreditation of the Eltel Industries – Calibration Laboratory (including on-site calibrations) in electro-technical discipline in accordance to ISO/ IEC:17025:2005.

An ISO 9001-2008 Certified Company

(Specifications subject to change without notice)