



2830 / 2831

Precision Oil and Solid Dielectric Analyzer



The Tettex 2830/2831 is the result of extensive research and years of experience testing dielectric properties of liquid and solid insulating materials. **It incorporates a fast and highly advanced procedure to measure Capacitance and $\tan \delta$, DC resistance and relative permittivity ϵ_r (dielectric constant) of liquid or solid insulating materials.** A simple one-time-connection system together with resistance measurement according to pre-selected standards drastically reduces measuring time.

The system consists of 2830, the measuring bridge and control unit, and 2831, the extension unit. **This system is a complete replacement of the Tettex 2821 and 2822.**

The 2830 contains the controller and the measurement part of the system.

The 2831 extension unit contains a standard capacitor, 2.5 kV AC & DC supplies and a temperature control unit.

Up to two oil test cells (type 2903) or one solid test cell (type 2914) can be heated at the same time.

FEATURES AND BENEFITS

- **C and $\tan \delta$ measurement, DC resistance measurement and relative permittivity ϵ_r** , on liquid and solid insulating materials made easy – simple one-time-connection.
- Large 12" TFT display with touch screen interface and full graphical test visualization
- **Pre-selected oil-testing standards selectable** IEC, VDE, BS, ASTM
- Customized programmable sequence and manual mode
- Integrated AC power supply 0 – 2'500 V and 40 - 65 Hz adjustable control
- Integrated DC - Power Supply 250 V - 2.5 kV adjustable
- 2 independent integrated temperature control units
- Integrated ambient temperature and humidity sensor
- Place to connect two oil test cell heater 2903 or one solid test cell 2914
- Existing Tettex test cells 2903 and 2914 can be used
- **Data transfer** over USB memory-stick

APPLICATIONS

C and $\tan \delta$ measurement and resistance measurement on liquid and solid insulating materials.

- Transformer Oil
- Oil Paper
- Solid materials (Teflon, Silicone, Rubber etc.)

The 2830 / 2831 is a valuable tool for factory tests, routine tests, R&D tests and regular maintenance.



TECHNICAL SPECIFICATIONS

Measurement 2830	Range	Max. Resolution	Accuracy
Dissipation Factor ($\tan \delta$) ₁	0 .. 100	1×10^{-5}	$\pm 0.5 \% \text{ rdg} \pm 1 \times 10^{-5}$
Capacitance ₂	$\geq 10 \text{ pF}$	0.001 pF	$\pm 0.2 \% \text{ rdg} \pm 0.01 \text{ pF}$
Relative Permittivity ϵ_r	1 .. 30	1×10^{-3}	
Resistance (Solid)	120k Ω ... 5T Ω ₃	1k Ω	< 1T Ω $\pm 5\% \text{ rdg} +3 \text{ digits}$ $\geq 1T\Omega \pm 15\% \text{ rdg} +3 \text{ digits}$
Resistivity (Liquid) ₄	900 k Ωm .. 33 T Ωm ₅		
Test Current @ Input Cx	10 μA .. 10 mA	0.01 μA	$\pm 0.1 \% \text{ rdg} \pm 0.1 \mu\text{A}$
Test Current @ Input Cn	10 μA .. 10 mA	0.01 μA	$\pm 0.1 \% \text{ rdg} \pm 0.1 \mu\text{A}$
Test Frequency	15 - 100 Hz	0.01 Hz	$\pm 0.1 \% \text{ rdg} \pm 0.1 \text{ Hz}$
Power Supplies 2831	Range	Max. Resolution	Accuracy
AC Test voltage	40 ..2500 V AC	1 V	$\pm 0.3 \% \text{ rdg} \pm 1 \text{ V}$
AC Frequency	40 – 65 Hz	0.1 Hz	
AC Current max.	5 mA		
DC Test Voltage	250 – 2500 V	25 V	+10% rdg $\pm 20 \text{ V}$
Heater			
Heating Temperature	Ambient - 250°C	0.1°C	$\pm 0.5^\circ\text{C}$
Internal Standard capacitor ₂	Value		Accuracy
Dissipation Factor ($\tan \delta$)	1×10^{-5}		$\pm 2 \times 10^{-5}$
Capacitance	1nF $\pm 5 \% @ 25^\circ\text{C}$		$\pm 20 \text{ ppm}/^\circ\text{C}$
Additional Specifications			
Preprogrammed Standards	IEC 60247:2004; ASTM D924-08; ASTM D1169:2002; VDE 0380-2:2005; BS 5737:1979, SAC GBT 5654:2007		
Display	12" TFT, 800x600, integrated Touch-Screen		
Operating System	Embedded Windows XP		
Interfaces	3 x USB		
Data Format	XML, CSV		
Operating Temperature	10 .. 40°C		
Storage Temperature	-20 .. 70°C		
Humidity	10 .. 60 % RH. non-condensing		
Protection classes, Standards	IP20, IEC 61010, CE mark, General IEC 61326-1, IEC 61000-4-X, 61000-3-X, EN 55011, ANSI/IEEE C37.90		
Safety Specification	VDE 0411/part 1a , IEC/EN 61010-1:2002		
Supply 2830	90 .. 264VAC, 100 VA, 50 / 60 Hz		
Supply 2831	90 .. 264VAC, max. 1,7 kVA, 50 / 60 Hz		
Weight	21 kg (2830), 19kg (2831)		
W x H x D	2 pcs 48 x 27 x 44 cm (19" x 10.6" x 17.3")		

1 Accuracy values @ 50/60Hz

2 Range limit is given by test current and voltage

3 @ 2.5 kV (Rmax = 2 G Ω x Utest [V])

4 Resistivity range is given by the resistance range multiplied with the cell factor of the test cell (29093 = 0.113 x Cair [in pF])

5 Typical range (calculated with Cair = 60.0pF of 2903)

SCOPE OF SUPPLY

Oil and solid dielectric analyzer 2830 and 2831
Test Certificate
Set of connection cables
User Manual

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OPTIONS

2903 Test Cell for Liquid Insulants



GENERAL

The precision test cell type 2903 measures the dielectric properties of liquid insulants such as insulating oil, it determines the dissipation factor $\tan \delta$ and the relative permittivity (dielectric constant) ϵ_r , as well as the specific resistivity. The test cell has been designed as a cylindrical capacitor with a shielded measuring electrode (guard ring capacitor) & thus avoids partial capacitances, which might influence the test results.

The test cell design is according to IEC 60247:2004; ASTM D924-08; ASTM D1169:2002; VDE 0380-2:2005; BS 5737:1979.

The temperature controller built into the 2831 is used to heat up the test cell.

TECHNICAL SPECIFICATIONS

No-load capacitance	approx. 60 pF
Electrode spacing	2 mm
Content	40 ml
Electrode	stainless steel, micro finished
Electrode temperature	ambient .. +150°C
Heating capacity	heating jacket 300 W, heating cartridge 150 W, total 450 W
Heat-up time	35 min (up to 90°C)
Electric strength in air	2000 V RMS
Max. electric field	10 kV/cm
Dimensions	0 95x175 mm (3.8x6.9 ins) Test cell type 2903a 0 240x220 mm (9.5x8.7 ins) Test cell 2903a with heating pot 2903
Weight	5.2 kg (11.5 lbs) Test cell type 2903a 8.2 kg (18 lbs) Test cell with heating type 2903



*2914 Test Cell
for Solid Insulants*



GENERAL

The test cell is used for dielectric tests on solid test samples. It determines dissipation factor $\tan \delta$ and relative permittivity (dielectric constant) ϵ_r on solid insulates such as paper and plastic foils, as well as specific resistivity.

The test cell is equipped with a shielded measuring electrode (guard ring) which eliminates partial capacitances which influence test results.

The design is the result of longstanding experience in the field of test cell building. It has been designed in accordance with specifications of VDE (Germany) & of SEV (Switzerland) as well as with ASTM standards (USA) and conforms to recommendations of CIGRE, IEC and ISO.

TECHNICAL SPECIFICATIONS

Test surface	20 cm ²
Diameter of measuring electrode	49.5 mm
Electrode	stainless steel, hardened, lapped
Heating capacity	2 heating plates of 630 W each, 1260 W together
Electrode temperature	ambient ...+250° C continuous, (1h, 50% duty cycle)
Heating-up time	approx. 15 min.
Temperature control:	with temperature controller built in 2831
Electrode pressure	0...10 N/cm ² , adjustable
Max. test voltage	2000 V RMS, 50/60 Hz
Test cell evacuation up to	3 x 10 ⁻⁴ mbar

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