HAEFELY HIPOTRONICS

2820A

C, L & Measuring bridge

■ **The Dielectric-Loss Analyzing System 2820a** is designed for measurement of low dielectric losses and impedances (Dissipation Factor and Power Factor) of high-voltage apparatus (e.g. the insulation of bushings).

The instrument works on the principle of a combined bridge-vector-meter and is capable of analyzing capacitive and inductive loads with high accuracy and stability.

The Graphical User Interface of the instrument is highly intuitive, focussed on convenience with built-in useful programs (e.g. support tool for tuning the external high-voltage supply) and uses a large colour touch screen as the input device.

The operator can choose between manual or automatic modes. While the manual mode provides quick measurements, the automatic test mode supports complete automated test sequences.

Advanced software functionalities such as insulation temperature correction, programmable test sequences with pass/fail limits, graphical visualisation of measured data, etc. make this instrument a powerful tool for analysis of high-voltage equipment.

The built-in industrial computer with standard interfaces (e.g. USB) enables easy exchange of measurement results, related settings, etc. for further analysis or reporting.

FEATURES AND BENEFITS

☑ **Accuracy capacitance 0.1%, tan□□1x10^{-4}**

☑ **Additional signal analysis capabilities** like Spectrum Analyser, Digital Scope and Data Logger are integrated

☑ **Advanced,** well-engineered test equipment, optimised to the specific application

☑ **Compact,** reliable and EMC hardened design

☑ **Integrated solution** with built-in industrial computer

BENEFITS

- **Easy to operate** with Manual and Automated test modes, Software assisted test preparation, Execution and Trend analysis.
- **Complete Measuring** System including power supplies, standard capacitors, current comparators, test cells, application support and calibration from one supplier.
- **Wide Application Range.** Losses of all types of insulation including shunt reactors under unstable power frequency can be measured.
- **Upgrade.** Outdated Tettex bridge models (e.g. 2877, 2801, 2821, etc.) can be easily replaced, with existing cable sets.

APPLICATIONS

Turns ratio, voltage ratio, phase displacement and excitation current measurements according to ANSI, IEC and Australian standards on:

- Power Transformers
- Distribution Transformers
- Instrument Transformers
- Liquid or Solid Insulations
- Rotating Machines
- Generators
- Cables
- Capacitors
- Breakers
- Surge Arrestors
- Bushings
- Others

EASY OPERATION

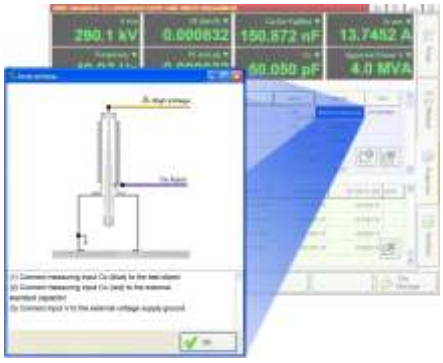
With its self-explanatory graphical user interface this equipment is designed for simple operation. Test planning, preparation, execution and first assessment can be handled with just a fingertip. Additionally the touch-screen seals the equipment against environmental influences.

If desired a USB keyboard and mouse can also be connected.

SEQUENCE MODE

The software efficiently performs complete test sequences. Sequences can be programmed in the instrument itself or with the optional software package on a separate computer and then uploaded to the instrument.

Predefined test sequences allow tests to be executed by users who lack advanced knowledge of the test process. The test time for setup can be reduced significantly with definable pop-up graphics. These Pop-ups also help in reducing the likelihood of wrong connections or misinterpretation of test results.



Connection diagram picture (top) and the corresponding instruction text (bottom).

A test sequences consists typically of the following instructions:

- Setups: Type of DUT (Device Under Test), insulation type, temperature correction, serial numbers, test personnel, etc.
- Test levels: Set the desired test voltage levels
- Definition of measuring values to be recorded: e.g. Voltage, Frequency, tan _, Power Factor, Current, Insulation Temperature, etc.
- Test instructions: Instructions with pictures can provide the test personnel with a step by step guide.
- Pass/fail levels: Limits can be set absolute or relative

A Data base of temperature correction curves for different insulation materials is used to recalculate measurements to reference conditions (20°C, 68°F) automatically. The predefined set of curves can be easily expanded or changed by the user.

ANALYSIS FUNCTION

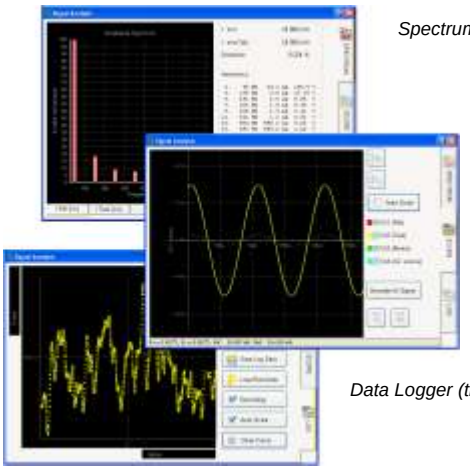
The graphical display of measured data makes this instrument a powerful tool for analysis of high-voltage equipment. The analysis function can be used as follows:

- Comparison against limits (Pass/fail level)
- Trending Analysis (comparison over time)
- Comparison of different samples - Array of measuring curves corresponding to different test objects, phases etc.
- Free definable axis (e.g. tanδ vs. voltage, C vs. voltage, tanδ vs. time, etc.)

The Analysis screen with a list of stored measurements (top) and the corresponding diagram window (bottom)

SIGNAL ANALYSIS

Integrated signal analysis tools are helpful for research and development when sample measurements and type tests are performed. The system analyses curve forms, and spectrum show slow drifts and trending of the user-selected measuring value.



Spectrum Analyser

Scope

Data Logger (trending)

REPORTING

All measurements including test object data are saved in XML & CSV format, which allows easy display, printing of test reports and transfer to database applications (e.g. with MS ACCESS™).

TECHNICAL SPECIFICATIONS

	Range	Max. Resolution	Accuracy
Dissipation Factor (tan δ) 1	0 .. 100	1 x 10^{-5}	± 1 % rdg ± 1 x 10^{-4}
Power Factor (cos φ) 1	0 .. 1	1 x 10^{-5}	± 1 % rdg ± 1 x 10^{-4}
Capacitance 2	≥ 1 pF	0.01 pF	± 0.1 % rdg ± 0.1 pF
Inductance 2	≤ 1000 kH	0.1 mH	± 0.2 % rdg ± 0.3 mH
Test Voltage	> 5V 5	1 V	± 0.3 % rdg ± 1 V
Test Current @ Input Cn	20uA .. 300 mA	0.1 uA	± 0.3 % rdg ± 1 uA
Test Current @ Input Cx	20uA .. 15 A	0.1 uA	± 0.3 % rdg ± 1 uA
Test Frequency	15 .. 1000 Hz	0.01 Hz	± 0.1 % rdg ± 0.1 Hz
Apparent Power S 2	≥ 1 mVA	0.1 mVA	± 0.5 % rdg ± 1 mVA
Real Power P 2	≥ 1 mW	0.1 mW	± 0.5 % rdg ± 1 mW
Reactive Power Q 2	≥ 1 mvar	0.1 mvar	± 0.5 % rdg ± 1 mvar
Recorded Values	DF (tanδ), DF (tanδ)@20°C, DF (tanδ) [%], DF (tanδ) [%]@20°C, PF (cosφ), PF (cosφ)@20°C, PF (cosφ) [%], PF (cosφ) [%] @20°C, QF (quality factor), QF (quality factor)@20°C, C_P (Z_X= C_P || R_P), R_P (Z_X= C_P || R_P), C_S (Z_X= C_S + R_S), R_S (Z_X= C_S + R_S), L_S (Z_X= L_S + R_S), R_S (Z_X= L_S + R_S), L_P (Z_X= L_P || R_P), R_P (Z_X= L_P || R_P), Cn (Standard Capacitor Value), U_{RMS}, U/√3, Ix RMS, In RMS, I_m, I_{fe}, Impedance Zx, Phase-angle φ (Zx), Admittance Yx, $Frequency_{Test}$, $Frequency_{Line}$, Apparent Power S, Real Power P, Reactive Power Q, $Real\ Power_{@2.5kV}$, $Real\ Power_{@10kV}$, $Temperature_{Ambient}$ 3, $Temperature_{Insulation}$ 3, Rel.Humidity 3, Temp.Corr.Factor K, Connection mode, Settings, Notes, Comments, Time, Date		
Measuring Time	0.3 sec / measurement @ averaging = 1		
Measuring Channels	2 (Cn & Cx)		
Display	12" TFT, 800x600, integrated Touch-Screen		
Operating System	Embedded Windows		
Interfaces	4 x USB 1 x Ethernet 10/100 4		
Data Format	XML, CSV		
Operating Temperature	-10 .. 50°C		
Storage Temperature	-20 .. 70°C		
Humidity	5 .. 95 % r.h. 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	115VAC / 230 VAC selectable, 250VA, 50 / 60 Hz, PFC		
Weight	21kg (47lbs)		
W x H x D	48 x 27 x 44 cm (19" x 10.6" x 17.3")		

1 Accuracy values @ 50/60Hz ; THD of power source <10%; for detailed range dispersion and preconditions for accuracy values see user manual.
2 Range limit is given by test current and voltage of used power source
3 These values are measured with an external device (option).
The values can be entered into the unit for temperature correction calculations and documentation purposes.
4 Allows communication respectively control of the unit
5 20uA/ωCn .. 300mA/ωCn

SCOPE OF SUPPLY (ORDER CODE 3490064)

- C, L & tan δ Measuring Bridge 2820a Instrument
- Mains cable (country specific)
- Operating Instructions and Test Certificate

For the connection cables please select desired type and length in "Accessories and Options"

ACESSORIES AND OPTIONS

Order code	Length	Description	Picture
4841867	-	Office Software package. Used for PC test preparation, data visualisation, staff education	
4841882		Field kit including: Rugged field cases for instrument, Rugged field cases for cables	
4841880 4841881	10 m 20 m	Complete connection cable kit for large DUT (e.g. power transformer) connection, including: Earthing cable with gripper, V-point connection cable (black), 1 measuring cable (blue) with clamps, 1 small clamp adaptor for measuring cables, C_n cable with plugs (orange)	
4841868 4841870 4841871 4841869	2 m 10 m 20 m xx m	Shielded C_x measuring cable (blue), Lemo3 – Lemo3 plugs Custom length on request (max. 50m)	
4841872 4840206 4840041 4841873	2 m 10 m 20 m xx m	Shielded C_n cable (orange), Lemo3 – Lemo3 plugs Custom length on request (max. 50m)	
4841876 4840207 4840168 4841877	2 m 10 m 20 m xx m	V-point guard cable (black) with lugs Custom length on request (max. 50m)	
4840186	-	Connection Lemo3 – alligator clip	
4840169	-	Connection Lemo3 – clamp	
107351	-	90° adaptor, Lemo3 – Lemo3 plug	
4841895		DUT Connection box Lemo3 – screw terminal	

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