



HAEFELY HIPOTRONICS

XIV. Szigetelésdiagnosztikai Konferencia

Felsőtárkány, 2014. 10. 29-31.



**HAEFELY AG IS
FOUNDED IN
BASEL IN 1904**

**TETTEX COMPANY IS
FOUNDED IN
ZURICH IN 1945**

**HIPOTRONICS COMPANY
IS FOUNDED IN
BREWSTER, NY IN 1967**

**ROBINSON & PARTNER LTD.
FOUNDED IN ENGLAND
IN 1965**

**HAEFELY ACQUIRES
TETTEX INSTRUMENTS
IN 1994**

**HIPOTRONICS
ACQUIRES ROBINSON
IN 1995**

HAEFELY
HIPOTRONICS



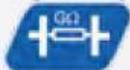
POWER TRANSFORMER APPLICATION



ROTATING MACHINE APPLICATION EXAMPLE



5478



INSULATION
RESISTANCE



C AND TAN δ
(POWER FACTOR)



MIDAS 288X + 5288a/89



WA 2293



WINDING
RESISTANCE



PARTIAL
DISCHARGES



MIDAS 288X + DDX9121b-1





FRA 5310 **FREQUENCY RESPONSE ANALYSER**

The Tettex FRA 5310 Sweep Frequency Response Analyser detects transformer winding movements and mechanical damage due to physical shock, transportation or short circuits.

The equivalent high frequency circuit of a transformer winding is a complex R-L-C-network. The measured frequency response (transfer function) of this network is unique analogous to a fingerprint. Changes in the winding geometry will be reflected by deviations between repeated measurements.



FREQUENCY
RESP. ANALYSIS

APPLICATIONS

- ✓ Power transformers



TTR 2795 & TTR 2796 TRANSFORMER TURNS RATIO METERS

The Tettex Transformer Turns Ratio meter family combines mobility and user friendly handling with unmatched accuracy of up to 0.03%.

APPLICATIONS

- ✓ Power- and distribution transformers
- ✓ Special transformers like phase shifting-, rectifier-, arc-furnace- and traction transformers
- ✓ Instrument transformers



URNS RATIO



ARBITRARY PHASE
SHIFT MEASUREMENT

TTR 2795 (100 V)

TTR 2796 (250 V)

Transformer Power	< 150 MVA	•	
	≥ 150 MVA		•



RVM 5462a **RECOVERY VOLTAGE METER**

The Tettex RVM5462 uses the proven recovery voltage measuring method, based on the polarization of the water molecules to measure the water content in the oil paper insulation and therefore indicates the transformers aging.

This method, used extensively since the 1980's, has shown consistent results independent of the geometry of the transformer. Thanks to the improved "Turbo RVM", a test is now performed in about 3 to 5 hours.

APPLICATIONS

- ✓ On site diagnostics of oil paper insulation on power transformers
- ✓ Factory detection of improper power transformer drying process



RVM
RECOVERY VOLTAGE



MIDAS 2880 & MIDAS 2881 MOBILE INSULATION DIAGNOSIS & ANALYSING SYSTEM

The MIDAS is an insulation test set for measuring power / dissipation factor / $\tan \delta$ on a variety of high voltage components in the factory and the substation. It includes a powerful and variable frequency high voltage source up to 15kV. The capabilities can be expanded with a variety of accessories to perform additional tests on transformers and rotating machines.



C AND TAN δ
(POWER FACTOR)



SHORT CIRCUIT
IMPEDANCE

APPLICATIONS

- ✓ Rotating machines
- ✓ Power transformers
- ✓ Instrument transformers
- ✓ Bushings
- ✓ Capacitors
- ✓ Circuit breakers
- ✓ Surge arrestors

	MIDAS 2880	MIDAS 2880G	MIDAS 2881	MIDAS 2881G
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Voltage	12 kV	•		•	
	15 kV		•		•
Controller	Laptop			•	•
	Touch Screen	•	•		



2883 MIDAS micro MOBILE INSULATION & DIAGNOSIS ANALYSING SYSTEM

The MIDAS micro is the smallest and most compact insulation test set on the market. The weight of only 25 kg / 55 lbs and the one box design makes it the ideal tool for power / dissipation factor / $\tan \delta$ and capacitance testing in the field and in the factory.

State-of-the art electronic design, advanced digital filtering and sophisticated calculation algorithms ensure highly stable results even under adverse conditions.

APPLICATIONS

- ✓ Power transformers
- ✓ Bushings
- ✓ Capacitors
- ✓ Circuit breakers
- ✓ Surge arrestors



C AND TAN δ
(POWER FACTOR)



VARIABLE FRE-
QUENCY TAN δ
(POWER FACTOR)



TIP-UP TEST



WA 2293 WINDING ANALYSER

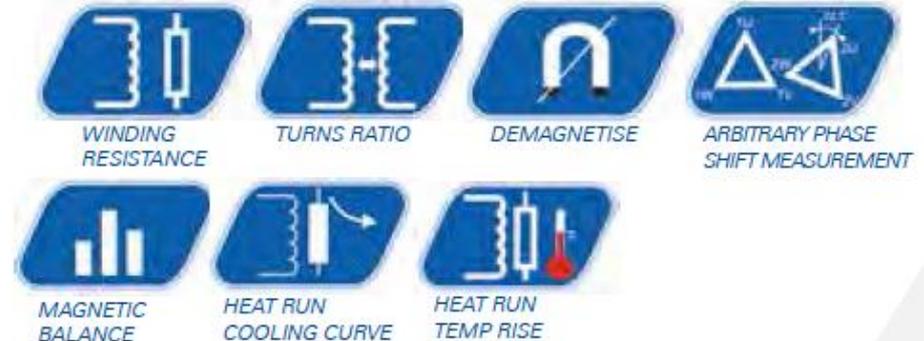
The Tettex 2293 is the world's first winding analyser that combines winding resistance and turns ratio measurement, demagnetisation, magnetic balance and heat run test in one instrument.

A simple one-time-connection system drastically reduces measuring time. Once connected all tests can be done in a row without reconnection.



APPLICATIONS

- ✓ Power transformers
- ✓ Distribution transformers
- ✓ Generators and motors
- ✓ Instrument transformers





2883 MIDAS micro

Mobile Insulation Diagnosis & Analysing System



C AND TAN δ
(POWER FACTOR)



VARIABLE FRE-
QUENCY TAN δ
(POWER FACTOR)



TIP-UP TEST

FEATURES AND BENEFITS

- ✓ Capacitance, dissipation / power factor testing
- ✓ Compact one-box design with only 25 kg / 55 lb
- ✓ 12 kV high voltage source
- ✓ Variable frequency 15 – 400 Hz
- ✓ Accuracy of 0.3% (capacitance) and 1×10^{-4} ($\tan \delta$)
- ✓ Safe operation with interlock, emergency stop, safety checks and HV ground surveillance
- ✓ 7" color touch screen for easy operation
- ✓ Three operating modes: basic, guide, advanced



Output

Voltage	100 .. 12'000 V _{RMS} (@ 45 .. 70 Hz)
Frequency	15 .. 400 Hz (Voltage ≤ 5 kV)
Current	180 mA _{RMS}
DUT Capacitance	max. 47 nF @ 12 kV _{RMS} @ 50 Hz, max. 39 nF @ 12 kV _{RMS} @ 60 Hz

Measurement	Resolution	Accuracy
Dissipation / Power Factor	0.0001	± 0.5 % rdg ± 0.0001 □ @ 50..60Hz
tan δ / cos φ □	0.01 %	± 0.5 % □ rdg ± 0.01 % @ 50..60Hz
Capacitance	0.01 pF	± 0.3 % rdg ± 0.3 pF
Test Voltage	1 V	± 0.3 % rdg ± 1V
Test Current	0.1 μA	± 0.3 % rdg ± 1 μA
Watts / Power	0.1 mW, mVA, mVAR	± 0.8 % rdg ± 1 mW, mVA, mVAR
Quality Factor	0.0001	± 0.5 % rdg ± 0.0001
Internal Reference	100 pF Reference Capacitance, tan δ < 0.00001 Temperature coefficient < 0.01 % / K, Capacitance ageing < 0.01 % / year	







RSKF

***VARIABLE FREQUENCY RESONANT TEST SYSTEM
ON SITE CABLE TEST***







RSKF 165 - 60

rated current
rated voltage



PRODUCT OVERVIEW

RSKF

165-60

260-83

CABLE RANGE

Cable Class [kV]	Test Voltage [kV]	Capacitance [μ F]	Cable Length [km]	Configuration	
132	132	1.9	9.5	1 - Series	
150	150	1.9	9.5	1 - Series	
220	180	3.4	17		1 - Series
275	210	2.6	13		1 - Series
330	250	1.8	9		1 - Series
380	260	1.6	8		1 - Series
500	320	0.9	4.5	2 - Series	
500	320	1.9	9.5		2 - Series

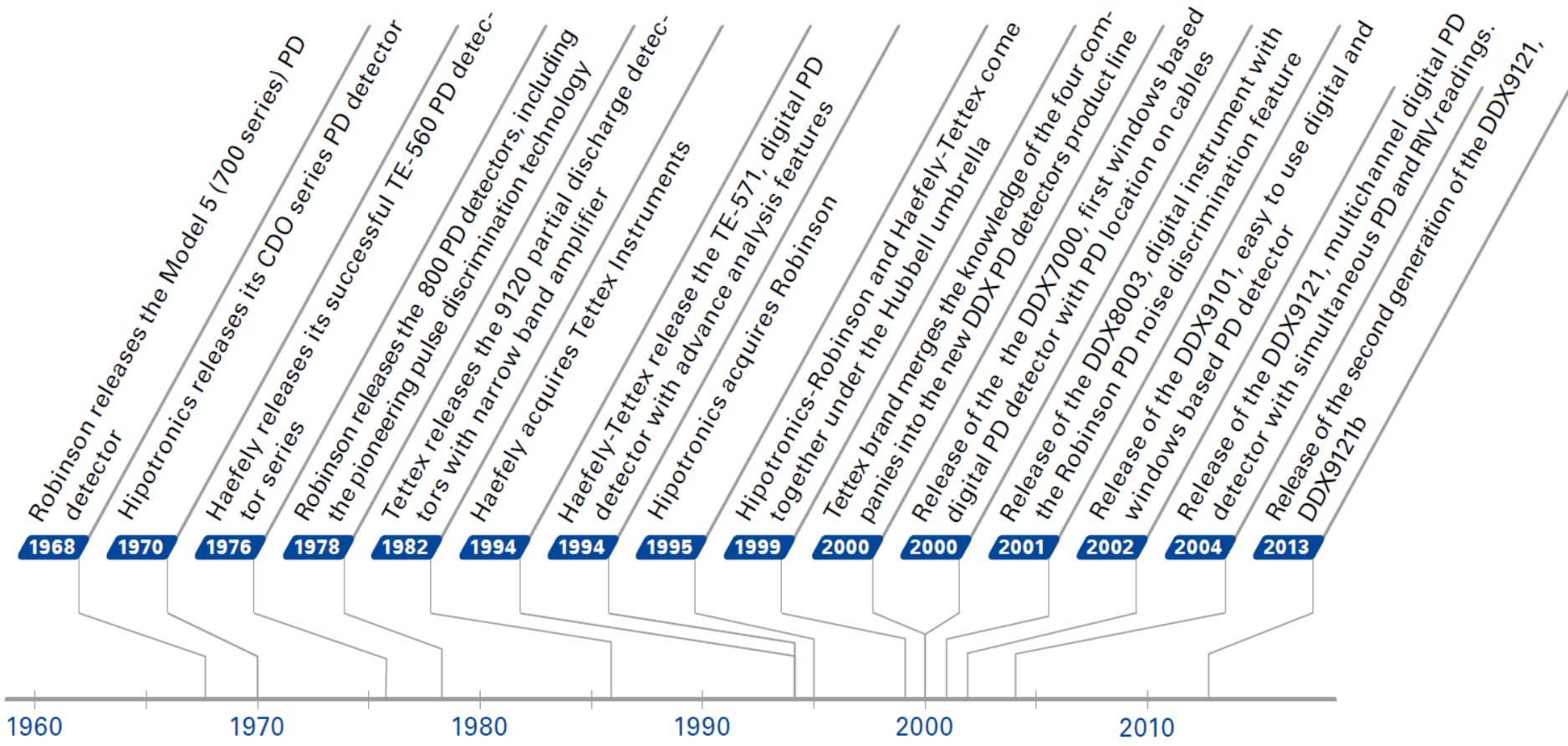


FEATURES

- Mobility with regular length trailers
- Withstand voltage test capability according to IEC
- Frequency range 20 ... 300 Hz
- Pure sinusoidal waveform at system output
- Standard 3 Phase diesel generator can feed the system
- Front end components and control room: air conditioned
- Thermal management: with wireless temperature sensors
- Thermal design: active cooling even for reactors with live tanks



PARTIAL DISCHARGE



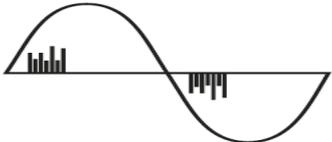
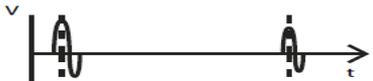


DDX 9101





PRODUCT LINE OVERVIEW

	DDX9101	DDX9121B	DDX7000	DDX8003
 Partial discharge AC	•	•	•	•
 Partial discharge DC		•	•	•
 Radio Interference Voltage (RIV)		•		
 Cable fault location			•	•



DDX 9121b

MULTICHANNEL DIGITAL PD DETECTOR



Applications:

- Power and Distribution Transformers
- Instruments Transformers
- Rotating Machines
- Power Capacitors
- Switchgears
- Surge Arrestors
- Research & Development



	<i>DDX9121-1</i>	<i>DDX9121-1/RIV</i>	<i>DDX9121-3</i>	<i>DDX9121-3/RIV</i>	<i>DDX9121-4</i>	<i>DDX9121-4/RIV</i>	<i>DDX9121-6</i>	<i>DDX9121-6/RIV</i>	<i>DDX9121-8</i>	<i>DDX9121-8/RIV</i>
SIMULTANEOUS PD INPUTS	1	1	3	3	4	4	6	6	8	8
NON-SIMULTANEOUS PD INPUTS <i>OPTION DDX9121B/MUX</i>	Opt. 4	Opt. 3	Opt. 12	Opt. 11	Opt. 16	Opt. 15	Opt. 24	Opt. 23	Opt. 32	Opt. 31
SIMULTANEOUS RIV INPUTS	No	1	No	3	No	4	No	6	Not	8
NON-SIMULTANEOUS RIV INPUTS <i>OPTION DDX9121B/MUX</i>	No	Opt. 3	No	Opt. 11	No	Opt. 15	No	Opt. 23	No	Opt. 31
PD ON DC <i>OPTION DDX9121B/DC</i>	Opt.	Opt.								
PHASE RESOLVING ANALYSIS	Yes	Yes								
SPECTRUM ANALYZER AND SCOPE	Yes	Yes								
SELECTABLE MEASURING BAND	Yes	Yes								

Opt. = Option



AKV9310



KAL 9520



9230





2840

High-Precision C, L & tan δ Measuring Bridge



FEATURES

- Accuracy capacitance 0.02%, tan δ 1×10^{-5}
- 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

TEVÉKENYSÉGEINK:

Műszerértékesítés

Mérőrendszerek

Diagnosztika

Irányítástechnika

Rendezvények

Keresés

E-mail cím:

Jelszó:

[Regisztráció](#)

Belépés

[Elfelejtette jelszavát?](#)

B&C

Visszatérő feszültség mérés (RVM) - B&C



Magyar fejlesztésű mérőműszer az olaj-papír szigetelési rendszerek általános állapotának vizsgálatára. A "magyar módszer". Cégünk egyik tulajdonosa, a B&C Kft. gyárja az egész világ számára Tettex márkanév alatt.

Könnyű, hordozható készülék 200 és 2000V között állítható mérőfeszültséggel. Az olaj papír rendszer polarizációs spektrumának vizsgálatával a papír nedvességtartalmára és öregedési állapotára lehet következtetni. Szigetelési ellenállásmérő funkcióval is rendelkezik.

Olaj-papír transzformátorok és papírkábelek vizsgálatára ajánlott. (Nemzetközi szinten folynak kísérletek a műszer használatának polietilén kábelek vizsgálatára történő kiterjesztésére.)

[Bővebben...](#)

Fokozatkapcsoló kapcsolási karakterisztika felvétele (MT-3 műszerrel) - B&C



Az MT3 műszer segítségével fokozatkapcsoló kapcsolási idő regisztrálás, tekercs ellenállás mérés, áttétel mérés és mágnesezési áram mérés valósítható meg...

Árajánlatkérés

[Bővebben...](#)

Tekercs impedancia karakterisztika (FRA) felvétel (TRAFTEK) - B&C



Transzformátortekercsek mechanikai elmozdulásának detektálására szolgáló műszer. A tekercselés, mint megoszló RLC hálózat a geometria megváltozása során, a jellemző rezonancia helyeit is változtatja. A