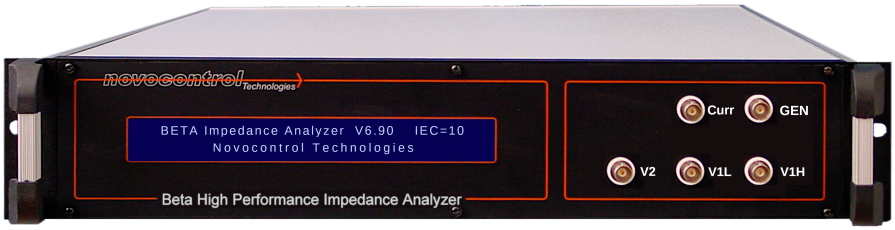

Advanced Impedance Analyzer Beta

- Advanced programmable analyzer for highly accurate impedance measurements
- Two/three/four-terminal measurement configurations selectable
- Ultra-wide requency range: 3 µHz ... 40 MHz
- Ultra-wide impedance range: 1 mΩ ... 100 TΩ, covered in one single measurement set-up
- Highest phase resolution of 0.001° to capture even the smallest losses in materials
- Fast data acquisition rate: 60 ms/point
- Optionally 1.7 ms/point in direct mode
- User-performed and software-assisted automatic self calibration and diagnosis compensates long term internal drift and verifies functionality.
- Harmonics measurements to analyze non-linearity effects
- High level command set for easy programming
- Powerful DETACHEM software package for turnkey applications

BETA

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NOVOCONTROL BETA

The Ultimate Tool For Electrical Materials Characterisation

In physics, chemistry, biology, and materials science, the interaction of electrical charges and dipoles in materials with external electrical fields is of particular importance.
As a leading leading manufacturer of broadband dielectric spectrometers, NOVOCONTROL Technologies excels in modern measuring techniques using AC impedance methods for the electrical characterisation of materials.
Our BETA analyzer is the measurement solution of choice for researchers who need, in a single instrument, a flexible input configuration for two-, three-, or four-terminal impedance measurements in the frequency domain. NOVOCONTROL Technologies' patented measuring techniques guarantee the highest accuracy and reliability, making this instrument first choice for sophisticated applications in R&D and QA/QC.

Stretching The Limits Of Impedance Measurements

In impedance measurements, larger impedance and frequency ranges substantially increase the number of systems, materials, and phenomena that can be studied. Using state-of-the-art digital processing techniques, NOVOCONTROL Technologies has succeeded in reaching formerly inaccess-

ible performance, such as ultrahigh input impedance, wide impedance range, ultralow capacity resolution and high tan δ resolution. These features create new options for impedance spectroscopy applications. By separating the signal current and the voltage sensing paths, the four-terminal configuration of the BETA analyzer, in particular, reduces the effects of lead inductance and stray capacitance which are particularly important in case where samples have to be connected via unusually long BNC cables.

Harmonics Analysis

In general, the electrical behavior of materials is expected to be linear. Some materials, however, exhibit an intrinsic non-linear behavior or are deliberately made non-linear for certain purposes or applications. The BETA analyzes higher harmonics of such materials by complex Fourier transformation. This opens the way to a new range of experiments, known as non-linear spectroscopy.

Specifications:

Ranges

Frequency: 3 µHz ... 40 MHz (13.1 decades)*
Impedance: 10^{-4} .. 10^{14} Ω (18 decades)
Capacitance: 1 fF ... 10 F (16 decades)
Loss factor tan(δ): 10^{-5} .. 10^{4}
AC signal out: 100 µV .. 3 Vrms
DC bias out: -40 VDC .. +40 VDC, 70 mA max**
Signal generator output impedance: 50 Ω
Voltage input: < ± 4.3 Vp dc or ac coupled

Differential Voltage Inputs with Driven Shields

Input impedance: 10^{12} Ω | 10 pF
Common Mode Rejection:
< 10^{-4} below 100 kHz; < 10^{-3} dB below 1 MHz
Input Bias Current: < 2.10^{-12} A

Base Accuracy

Relative Impedance, Relative Capacity,
Loss factor tan(δ): < 3.10^{-5} ***
Phase Angle: < 0.002° ***

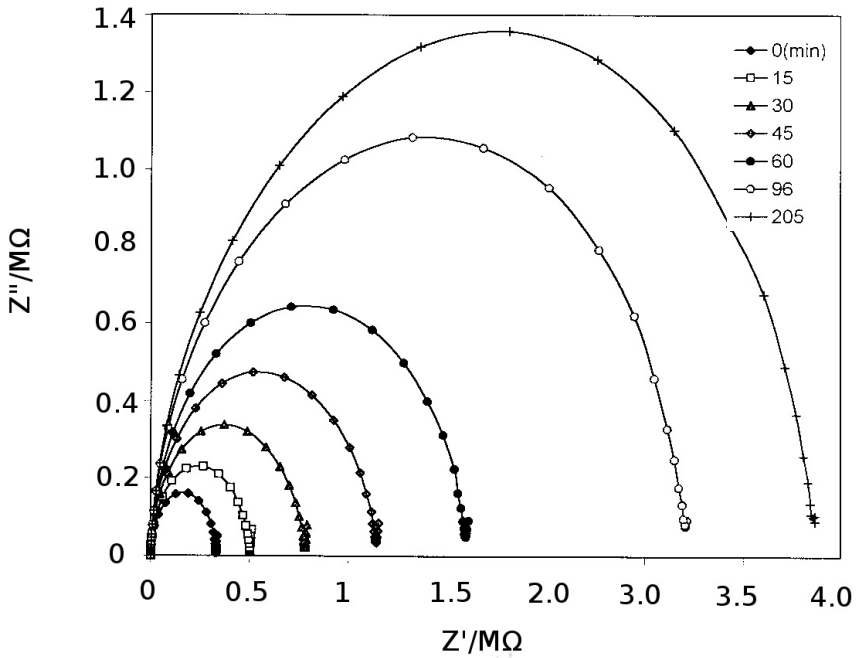
Resolution

Relative Impedance, Relative Capacity,
Loss factor tan(δ): < 10^{-5}
Phase Angle: < 0.0006°

User Calibrations

load, short, open, internal self calibration and diagnostics

* for the top-model Beta-T
** requires dc bias option B of the BETA
*** for details refer to specification charts



Complex impedance behaviour of PVDF (polyvinlylidene fluoride) for various crystallisation times, taken at 150 °C.