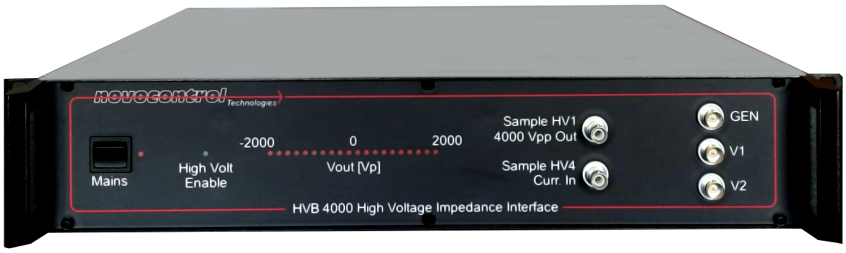


# HVB 4000
# High-Voltage Test Interface for the modular Alpha-A Dielectric Analysis system

- Excellent performance for general purpose dielectric and impedance measurements
- Accurate measurements with both high AC, high DC or combinations thereof up to 4000 Vpp
- Safe and reliable high-voltage applications
- Dedicated high voltage sample cell available
- Free variables: Frequency, AC, DC voltages, Temperatures (with Novocontrol temperature control systems Novotherm, Novocool, Quatro)

Applications:

- Non-linear dielectric and impedance spectroscopy of materials and devices
- Electronic and ion conduction studies
- Ferroelectrics and FLCs
- Leakage current of insulators
- High voltage engineering
- Materials degradation tests under electric stress (cables, bushings, dielectrics, general insulators)

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HVB 4000

novocontrol Technologies

## Safe High Voltage Measurements

Novocontrol impedance analyzers, renowned for highest accuracy and precision, deliver top performance in various applications, e.g., materials science, macromolecular research, semiconductor development, analysis of chemical reactions, and many more. The investigation of non-linear properties adds the requirement of high electric fields applied to the materials under test. The use of commercial high voltage amplifiers in combination with a highly sensitive measuring instrument like a Novocontrol impedance analyzer, however, is troublesome: chances are high that the measurement system might be damaged or even destroyed. It is, therefore, imperative to apply particular techniques that achieve protection against potential high voltage input signals.

## HVB 4000

The risk of severe instrument damages during high-voltage experiments is easily overcome by the application of the high voltage extension HVB 4000. In this device, a specially designed high voltage input amplifier ensures continuous and reliable operation in high voltage mode. The HVB 4000 is designed as a test interface for the Novocontrol Technologies advanced frequency analyzer ALPHA-A, which, in turn, is controlled by a computer typically running the Novocontrol WinDETA software. The software controls all functions of the test interface, resulting in a turnkey integrated solution for high-voltage dielectric and impedance measurements, including calibration and automatic reference capacitor selection for ultimate measuring accuracy. The HVB 4000 is equipped with interlock protection and safe high-voltage (SHV) connectors.

## Complete Software Support

The HVB 4000 high-voltage test interface is fully supported in terms of the control, diagnostics, calibration, set-up, data collection and their visualisation by the Novocontrol standard instrument control software DETACHEM.

### HVB 4000 Specifications

**Ranges:**
Frequency: 3 µHz ... 10 kHz (9.5 decades)
Impedance: 1 kΩ .. $2.10^{15}$ Ω (12 decades)
Capacitance: 1 fF ... 0.01 F (13 decades)
Loss factor tan(δ): $10^{-5}$ .. $10^{4}$
AC signal out: 20 mV .. 1414 Vrms, 2.7 mA max.
DC bias out: ±2000 VDC, 2.7 mA max. [2)]
Signal generator output impedance: 750 kΩ
Voltage input: < ± 2000 Vp dc coupled

**Base Accuracy:**
Relative Impedance, Relative Capacity,
Loss factor tan(δ): < $3.10^{-5}$ [2)]
Phase Angle: < 0.002° [3)]

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

**User Calibrations:**
open, internal self calibration and diagnostics

[1)] requires dc bias option B of the Alpha-A mainframe
[2)] for details refer to specification charts

## Extensions/Accessories

**Sample Cell**
- BDS1200HV2K high-voltage dielectric sample cell with protection interlock switch and Pt100 temperature sensor

**Temperature Control Systems**
- Quatro Cryosystem (-160 °C .. 400 °C)
- Novocool (-100 °C .. 250 °C)
- Novotherm (ambient .. 400 °C)

## Seamless Integration

The HVB test interfaces are easily integrated into various Novocontrol turnkey measurement systems (e.g., Concept 40, Concept 80)

### System requirements

- Novocontrol Alpha-A series dielectric/ impedance analyzer (older models before Rev. C require the DC bias option B)