ZG2 Test Interface for the Alpha-A Modular Measurement System

- Test Interface for Dielectric, Conductivity, Impedance Spectroscopy in two-electrode configuration and Gain Phase Measurements for the Alpha-A Modular Measurement System
- Very wide frequency range: 3 µHz to 40 MHz
- Extremely wide impedance range: 10 mΩ to 100 TΩ, i.e., 16 decades.
- Excellent phase and tan(δ) resolution and accuracy
- Connects your own sample cells to the Alpha-A system
- Recommended for usage with BDS 1200 sample cell (not included)

ZG2 Test Interface

The ZG2 test interface for the Alpha-A modular measurement system features high quality general purpose dielectric, conductivity, impedance spectroscopy in two-point mode as well as gain-phase measurements. Its highlights are the extremely wide impedance range and the impressive loss-factor resolution and accuracy.

The ZG2 is the two-wire economical alternative of the ZG4 test interface. It has the same functionality as the ZG4, but lacks the three- and four-electrode measurement options, supporting only two- electrode measurements.

The ZG2 exhibits top-class general purpose performance; it is particularly recommended for

- dielectric or conductive material samples in combination with the Novocontrol BDS 1200 parallel plate sample cell;
- passive customer home-built two-electrode sample cells;
- electronic components or materials.

The ZG2 can be combined with any type of sample cells or devices in two-wire mode via its front-panel BNC connectors. A sample cell is not included. For measurements on materials, the passive Novocontrol Technologies **BDS 1200** sample cell with shielding unit BDS 1230 is recommended.

The external interface design allows positioning the ZG2 test interface close to the sample or device under test, thus minimizing cable effects due to, e.g., cable induct- ance and subsonic noise which may influence the results in the the high and low frequency ranges, respectively.

ZG2 Specifications:

Ranges
Frequency: 3 µHz ... 40 MHz (13.1 decades)[*]
Impedance: 10^{-2} .. 10^{14} Ω (16 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

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

[*] in combination with the Alpha-A mainframe type AT
[**] requires dc bias option B of the Alpha-A mainframe
[***] for details refer to specification charts

Test Interface Recommendation

Select the ZG2 test interface for your Alpha-A modular measurement system if you

- need the flexibility of connecting other samples or devices via BNC connectors
- do not need the particular features of the ZG4 test interface (i.e., additional three- and four-point measurement option, voltage channels with driven-shield technology)

If the focus is entirely on materials measurements, the ZGS active cell interface provides slightly better performance than the combination of ZG2+BDS 1200 and should be preferred.

System requirements
- Impedance analyzer mainframe Alpha-A

ZG4 Test Interface for the Alpha-A Modular Measurement System

- Test Interface for Dielectric, Conductivity, Impedance 2, 3 and 4 Electrode Spectroscopy and Gain Phase Measurements for the Alpha-A Modular Measurement System
- Very wide frequency range: 3 µHz to 40 MHz
- Extremely wide impedance range: 0.1 m to 100 T , i.e., 18 decades.
- Excellent phase and tan(δ) resolution and accuracy
- Driven shields reduce influence of cable capacity on the voltage measurement
- Connects your own sample cells to the Alpha-A system
- Recommended for usage with BDS 1200 and Novotherm-HT sample cells (not included)

Novocontrol Technologies
GmbH & Co. KG
Aubachstr. 1
56410 Montabaur
Germany
Phone: +49 2602 9196690
Fax: +49 2602 91966933
e-mail: novo@novocontrol.de
web: http://www.novocontrol.de

ZG4 Test Interface

The ZG4 extension test interface for the Alpha-A modular measurement system features high quality general purpose dielectric, conductivity, impedance spectroscopy in two, three, and four point modes, and gain phase measurements.

Three and four point techniques are advantageously used to partly compensate electrode-sample interface polarization or contact impedance effects. The ZG4 test interface has the same functionality as the ZG2 interface but two additional differential voltage measurement channels for three and four point measurements.

The voltage channel input impedance of 10^{12} Ω | 10 pF exceeds the corresponding values of most competing instruments by several orders of magnitude, representing a major improvement in broadband three- and four-point measurements.

In order to reduce the cable capacity from the ZG4 voltage inputs to the voltage electrodes, the two voltage inputs support driven shield technology which keeps the potential of the outer coaxial cable shield at nearly the same potential as the sensitive inner cable conductor.

The ZG4 has high general purpose performance but is especially recommended for dielectric or conductive samples with

- significant electrode contact impedance or electrode sample interface polarization like, e.g. electrolytes;
- low impedance samples (below 1 Ω) like e.g. strong electrolytes, heavily doped semiconductors, metals, superconductors;
- electronic components or networks.

ZG4 Specifications:

Ranges
Frequency: 3 µHz ... 40 MHz (13.1 decades)[*]
Impedance: 10^{-4} .. 10^{14} Ω (16 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: < 0.006°

User Calibrations:
load, short, open, internal self calibration and diagnostics

*   in combination with the Alpha-A mainframe type AT
**   requires dc bias option B of the Alpha-A mainframe
*** for details refer to specification charts

The ZG4 can be combined with any type of sample cells for materials measurements in two/three/four wire modes via its BNC connectors. A sample cell is not included. For two-electrode configurations, the passive BDS 1200 sample cell is recommended. The external interface design allows to locate the ZG4 close to the sample in order to minimize cable effects due to, e.g., inductance and subsonic noise which may influence the results in the the high and low frequency ranges, respectively.

System requirements
- Impedance analyzer mainframe Alpha-A