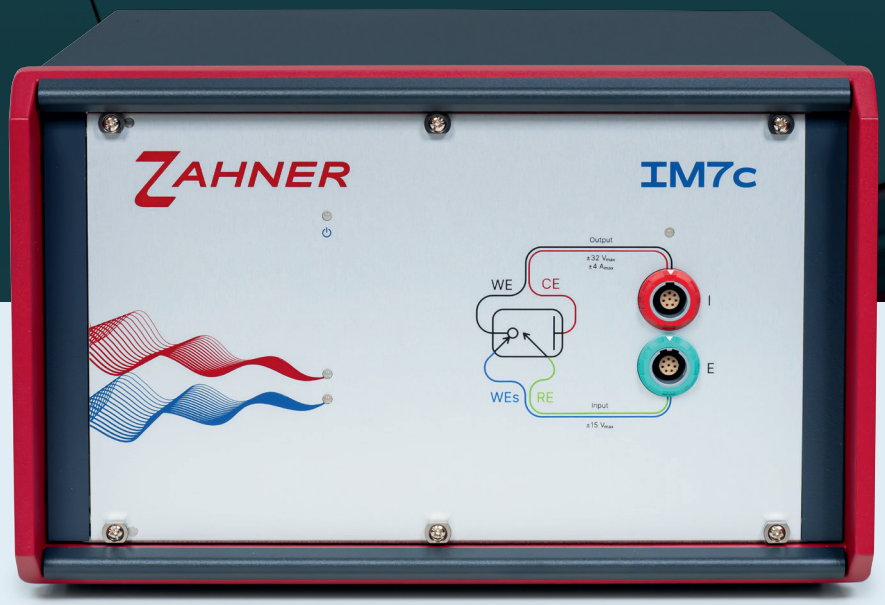
ZAHNER

PRECISION IN ELECTROCHEMISTRY



IM7c - Made in Germany

IM7c

THE COMPACT POTENTIOSTAT

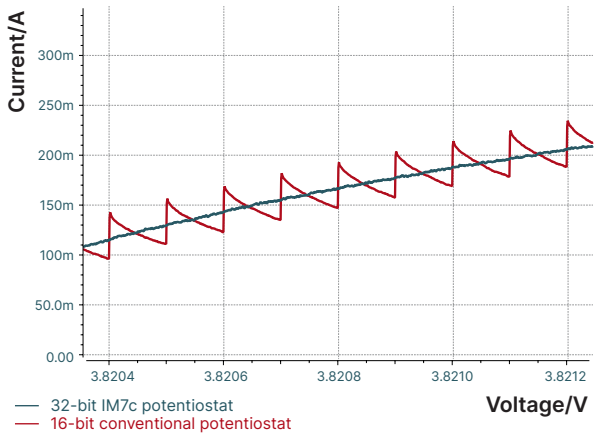
Application Fields

Zahner potentiostats are designed as a modular concept, giving users the **freedom to customize** their potentiostat according to their needs.

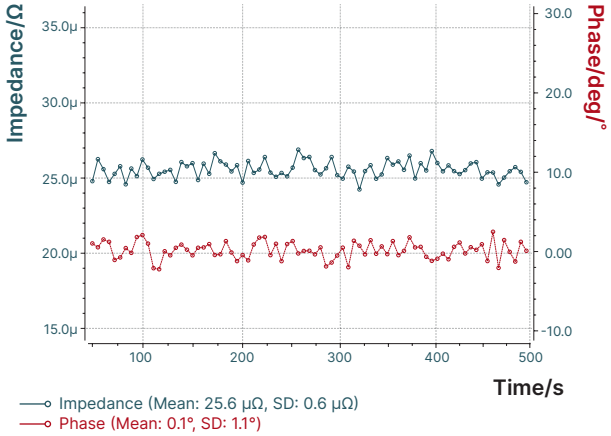
- Fundamental Electrochemistry
- Corrosion and Coatings

Main Specifications

- → EIS frequency range: 10 µHz – 5 MHz
- → 32-bit DC and 24-bit AC resolution
- → ±5 V / ±14 V voltage range
- → ±2 A over 12 current ranges
- → Online data processing for outstanding EIS



Slow CV scan with a scan rate of 10 µV/s on a LFP battery with the IM7 series potentiostat (32-bit DAC resolution) and a conventional potentiostat (16-bit DAC resolution).



Single frequency (1 Hz), single period impedance measurements on a 25 µΩ resistor vs. time. The measurement is carried out with 1 A amplitude.

„THE HIGH-END POTENTIOSTAT“

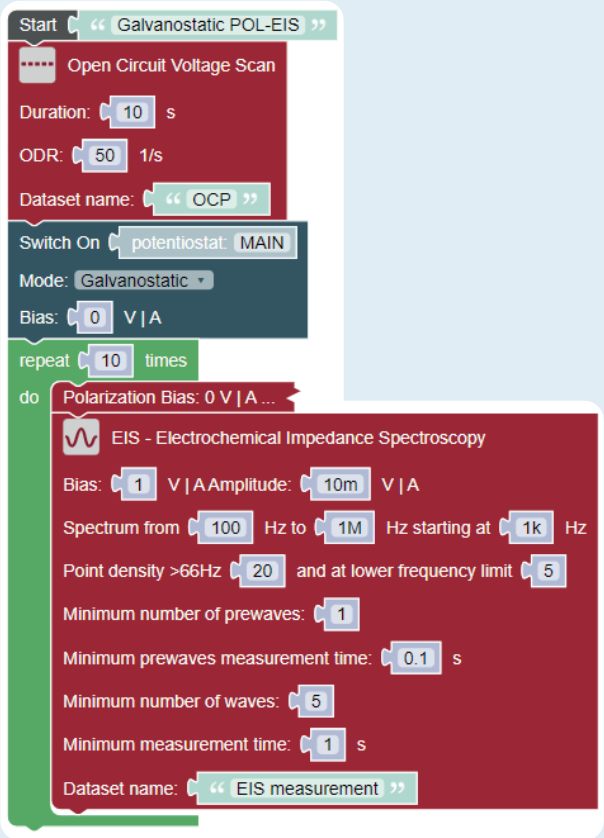
Custom Experiment Builder

For extensive measurement routines, the Custom Experiment Builder enables users to design complex and automated measurement sequences with maximum flexibility.

This powerful tool:

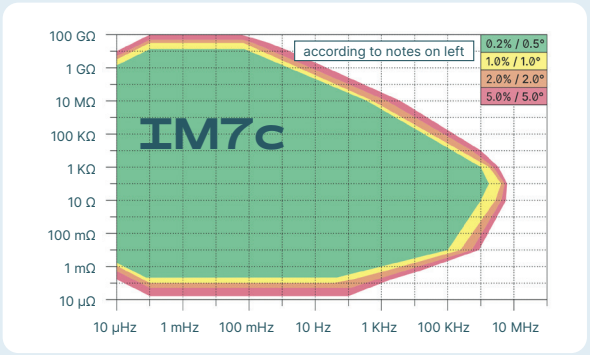
- → Uses individual measurement techniques as modular building blocks
- → Features an intuitive drag-and-drop interface for routine creation
- → Supports loops, conditions, variables, and mathematical functions
- → Enables fully customized experimental workflows

These capabilities make the Custom Experiment Builder ideal for both routine testing and advanced research applications.



Accuracy Contour Plot

- Z > 100 mΩ: potentiostatic mode, amplitude 10 mV
- Z > 1 MΩ: potentiostatic mode, amplitude 70 mV, shielded
- Z < 100 mΩ: galvanostatic mode, amplitude 100 mA
- Z < 1 mΩ: galvanostatic mode, amplitude 1 A
- Without DC bias voltage/current
- Specified at the lemosa terminals



Specifications

General	
Potentiostatic modes	potentiostatic, galvanostatic, OCP, FRA, ZRA, off
ADC resolution	32-bit DC, 24-bit AC
Harmonic reject	> 60 dB @ ½ full scale
Cell connection	2-, 3-, 4-terminal kelvin
Ground reference	grounded, floating
Interface	Gigabit Ethernet (GbE)
Dimensions / Weight	160 × 255 × 385 mm³ / 8 kg
Power supply	100/115/230 VAC, 50/60 Hz, 180 W
Ambient temperature / humidity	+10 °C to +30 °C / < 60% without derating
Storage	40 GB m.2 SSD
Operating system	Windows, Linux, and macOS

Input	Low range	High range
Max. Input voltage	±5 V	±14 V
Voltage resolution	3.2 nV	9.6 nV
Voltage accuracy	±100 µV ±10 ppm of reading	±300 µV ±30 ppm of reading
DC current resolution	2 aA (32-bit)	
DC current accuracy	±0.5% of reading ±0.4% of FS @ 300 mA ... 2 A ±0.05% of reading ±0.04% of FS @ 3 µA ... 300 mA ±0.5% of reading ±0.4% of FS @ 30 nA ... 3 µA ±0.5% of reading ±125 fA @ < 30 nA	
Input impedance	> 10 TΩ || ±5 pF typ.	
Input leakage current	< ±200 fA typ., < ±5 pA max.	
Impedance range	20 µΩ to 100 GΩ	see accuracy contour plot for detailed information
Max sampling rate	900 kHz at up to 2 channels	
Common mode rejection	> 86 dB @ 10 µHz to 100 kHz > 66 dB @ 100 kHz to 5 MHz	
Input channel phase-tracking acc.	±0.05° @ 10 µHz to 100 kHz ±0.125° @ 100 kHz to 5 MHz	
Equivalent effective input noise	1 µV rms / 100 fA rms @ 1 mHz to 10 Hz	

Output potentiostatic	Low range	High range
Controlled voltage	±5 V	±14 V
Resolution	2.5 nV	7.5 nV
Accuracy	±250 µV ±20 ppm of reading	±750 µV ±60 ppm of reading
Integral nonlinearity	typ. 4 ppm, max. 8 ppm	typ. 12 ppm, max. 24 ppm
Compliance voltage	±14 V	±14 V
Bandwidth	DC to 6 MHz @ 33 Ω load	
IR compensation	auto AC impedance technique, range 0 to 10 MΩ, resolution 0.012%	
Small signal rise time	150 ns to 200 µs in 5 steps, automatic selection	
Slew rate	15 MV/s	

Output galvanostatic	
Controlled current	±2 A
Current range	±3 nA to ±2 A in 12 current ranges
Resolution	32-bit ±0.2 ppb of FS
Accuracy	±0.1% of reading ±0.04% of FS, ≥ 3 µA to 300 mA ±0.4% of reading ±0.2% of FS, ≥ 3 µA to 300 mA

Frequency generator & analyzer	Low range	High range
EIS frequency range	10 µHz to 5 MHz	
AC amplitude	0 to 2 V, 24-bit resolution	0 to 6 V, 24-bit resolution
AC current amplitude	0 to 2 A, 24-bit resolution, in 12 current ranges	
Accuracy	< 0.0025%	
Resolution	0.0025%, 10,000 steps/decade	

Zahner Analysis

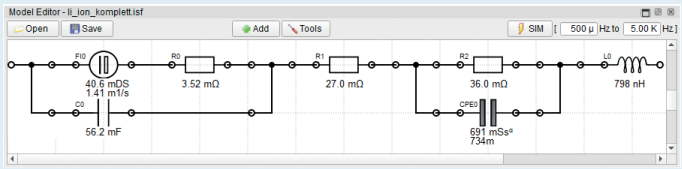
EIS fitting

- Create equivalent electrical circuits
- Fit impedance spectra
  - > Single fit
  - > Series fit
- ZHIT tool
- Significance plot
- Fitting accessible via HTTP-API

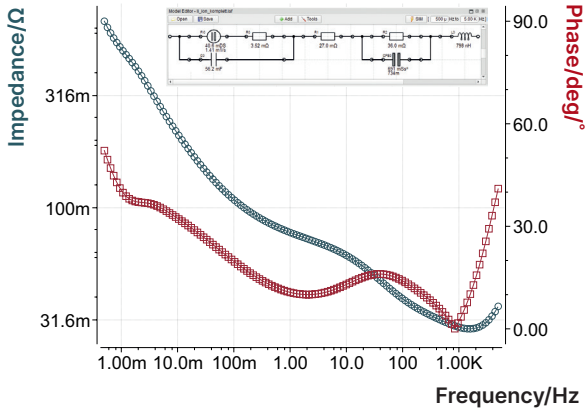
Other techniques

- Cyclic voltammetry
  - > Peak determination
  - > Charge integration
- Tafel slope measurements
- Butler-Volmer measurements
- Analysis of photoelectrochemical measurements

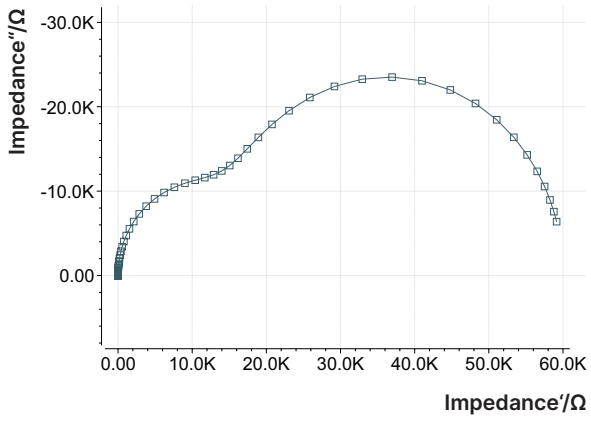
Check out Zahner Analysis videos:



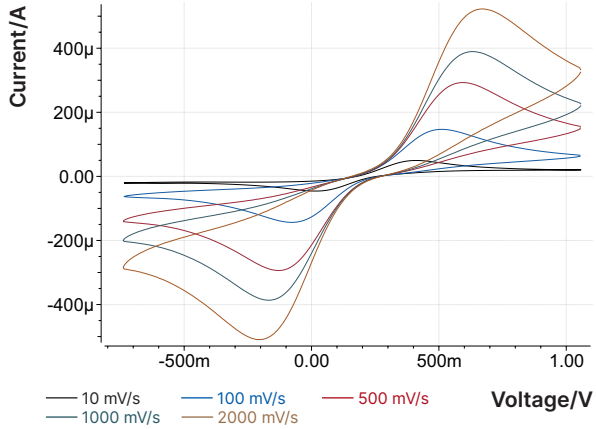
Create your own equivalent electric circuit for EIS fitting



Impedance spectrum (Bode plot) of a battery with the equivalent electrical circuit



Impedance spectrum (Nyquist plot) with two time constants



CV scans measured at different scan speeds

ZHIT

The Zahner Analysis software features the unique **ZHIT** tool, which helps identifying artifacts in impedance spectra and allows reconstruction of artifact-free impedance spectra for fitting.

Significance Plot

Zahner Analysis software features an exclusive tool called the **significance plot**, which evaluates the frequency-dependent significance of equivalent circuit elements in the fitting.

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