ZAHNER

PRECISION IN ELECTROCHEMISTRY

IM7 - Made in Germany

IM7

THE ALL-PURPOSE POTENTIOSTAT

Application Fields

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

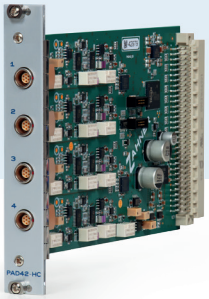
- Fundamental Electrochemistry
- Batteries, Fuel- and Electrolysis Cells
- Corrosion and Coatings

Addon Cards

Plug-and-play cards introduce additional input/control signals to the **IM7 potentiostat.**

MIO

- Additional analog & digital input/output channels for the IM7 potentiostat
- Allows process automatization via Custom Experiment Builder or remote integration
- Analog channels provide 16-bit resolution at a range of ±10 V

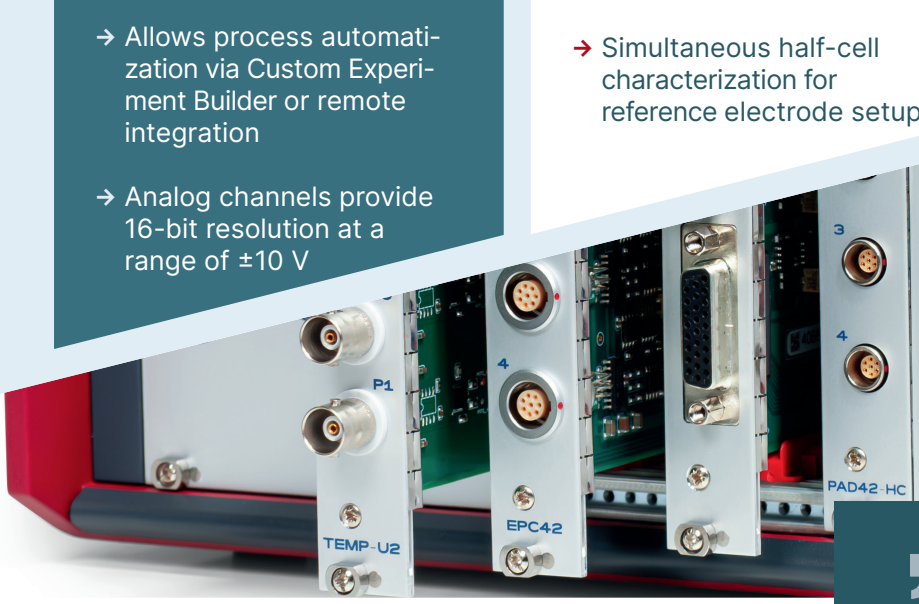


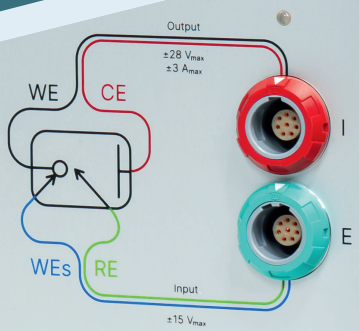
PAD42

- For detailed stack characterization
- Enable 24-bit synchronous measurements on each cell in a stacked system (batteries, fuel & electrolysis cell stacks)
- Simultaneous half-cell characterization for reference electrode setups

TEMP-U2

- Two temperature recording channels
- Two configurable input-voltage channels for recording data from external devices like a pH meter, pressure chamber, etc., during electrochemical measurements





> "EXTEND THE FUNCTIONALITY OF YOUR POTENTIOSTAT"

Extensions For Power Applications

Extend your **IM7 potentiostat** for high quality impedance spectra at high currents.

Extension For Medium Power Applications

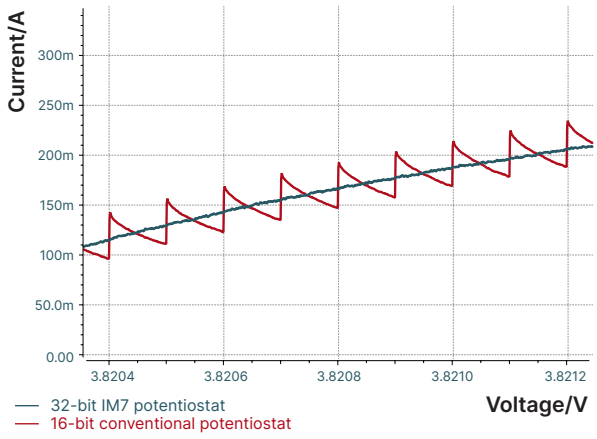
- Power potentiostats (PP) with power up to 200 W
- Current up to ±40 A, voltage up to ±20 V
- Remote integration possible via C++ and Python

Extension For High Power Applications

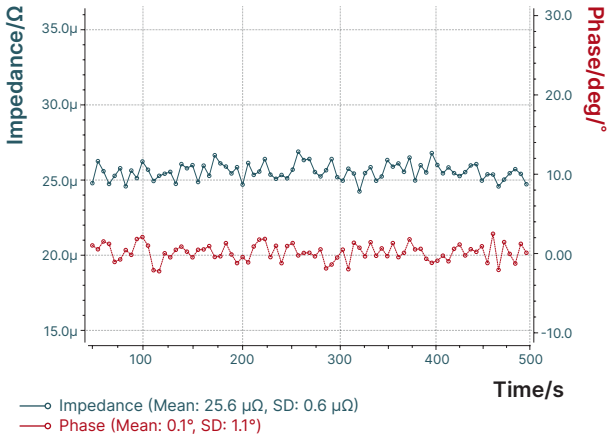
- Electronic load (EL) system with power up to 68 kW
- Current up to ±680 A, voltage up to ±100 V
- Remote integration possible via C++ and Python

Main Specifications

- EIS frequency range: 10 µHz – 8 MHz
- 32-bit DC and 24-bit AC resolution
- ±5 V / ±15 V voltage range
- ±3 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"

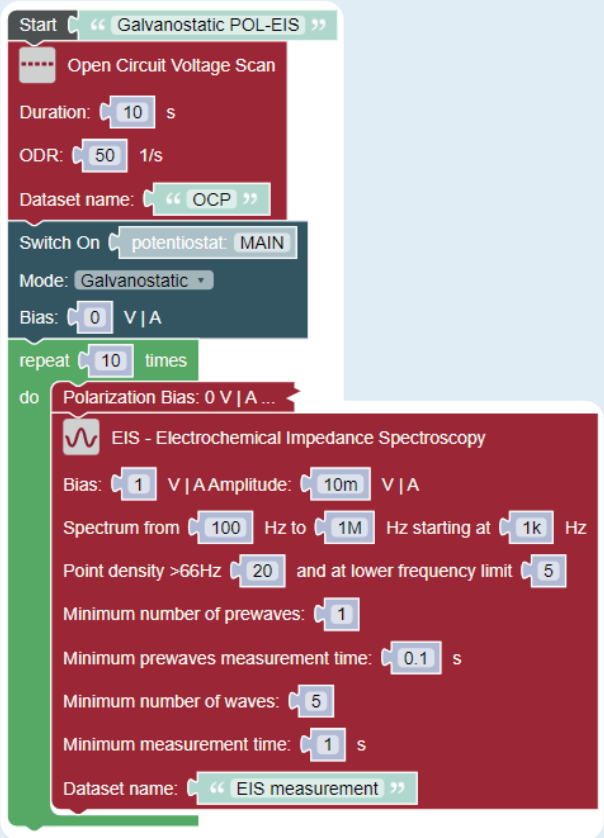
Custom Experiment Builder

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

This powerful tool:

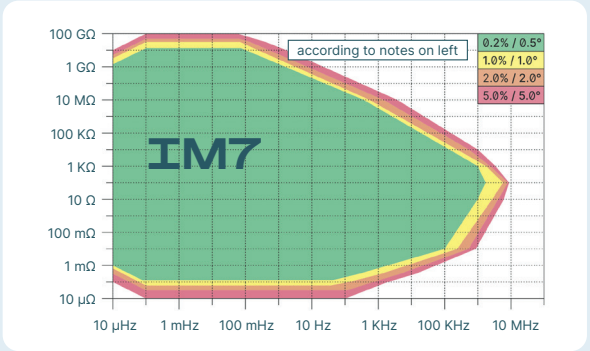
- Uses individual measurement techniques as modular building blocks
- Features an intuitive drag-and-drop interface for routine creation
- Supports loops, conditions, variables, and mathematical functions
- Enables fully customized experimental workflows

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 2 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 × 364 × 376 mm³ / 11.4 kg
Power supply	100/115/230 VAC, 50/60Hz, 300 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	±5.5 V	±16 V
Voltage resolution	3.2 nV	9.6 nV
Voltage accuracy	±50 µV ±5 ppm of reading	±150 µV ±15 ppm of reading
DC current resolution	2 aA (32-bit)	
DC current accuracy	±0.5% of reading ±0.2% of FS @ 300 mA ... 3 A ±0.05% of reading ±0.02% of FS @ 3 µA ... 300 mA ±0.5% of reading ±0.2% 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., < ±2 pA max.	
Impedance range	10 µΩ to 100 GΩ	see accuracy contour plot for detailed information
Max sampling rate	900 kHz at up to 2 channels, 3 MSps total	
Common mode rejection	> 86 dB @ 10 µHz to 100 kHz > 66 dB @ 100 kHz to 8 MHz	
Input channel phase-tracking acc.	±0.05° @ 10 µHz to 100 kHz ±0.125° @ 100 kHz to 8 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	±15 V
Resolution	2.5 nV	7.5 nV
Accuracy	±150 µV ±15 ppm of reading	±450 µV ±45 ppm of reading
Integral nonlinearity	typ. 2 ppm, max. 4 ppm	typ. 6 ppm, max. 12 ppm
Compliance voltage	±14 V	±28 V
Bandwidth	DC to 10 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	±3 A
Current range	±3 nA to ±3 A in 12 current ranges
Resolution	32-bit ±0.2 ppb of FS
Accuracy	±0.05% of reading ±0.02% of FS, ≥ 3 µA to 300 mA ±0.2% of reading ±0.1% of FS, < 3 µA or > 300 mA

Frequency generator & analyzer	Low range	High range
EIS frequency range	10 µHz to 8 MHz	
AC voltage 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

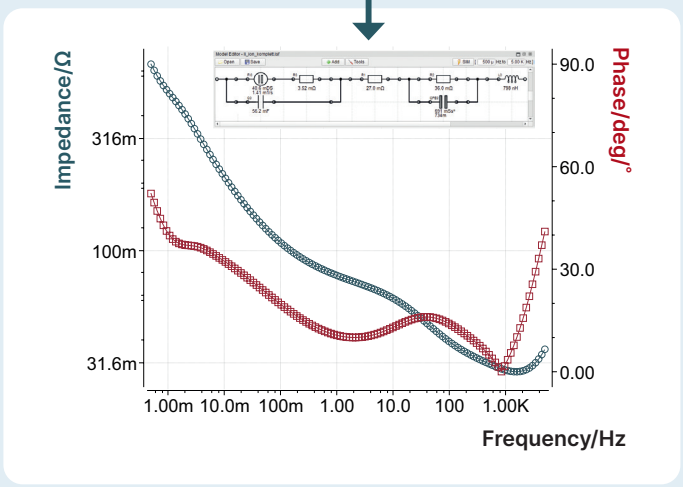
EIS fitting

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

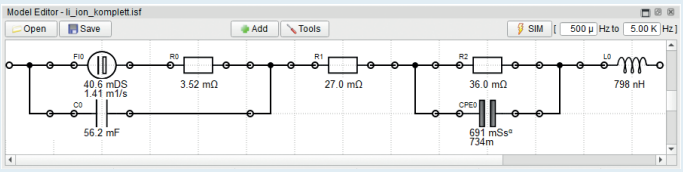
Other techniques

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

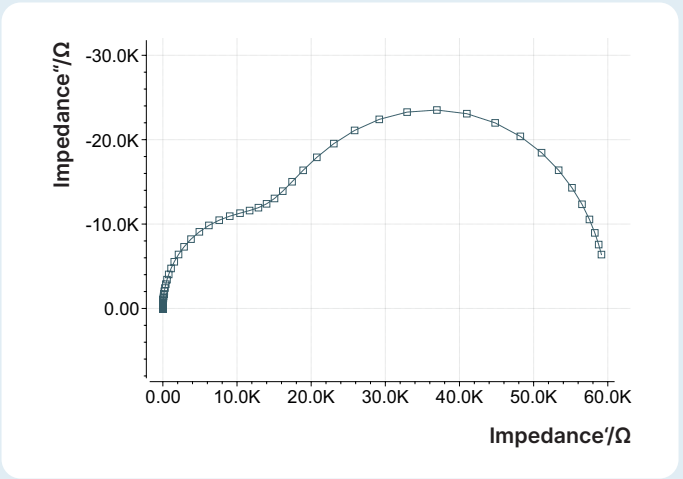
Check out Zahner Analysis videos:



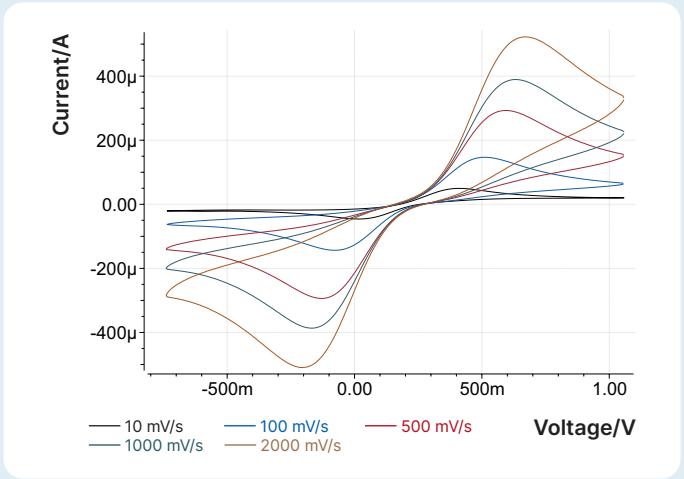
Impedance spectrum (Bode plot) of a battery with the equivalent electrical circuit



Create your own equivalent electric circuit for EIS fitting



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.

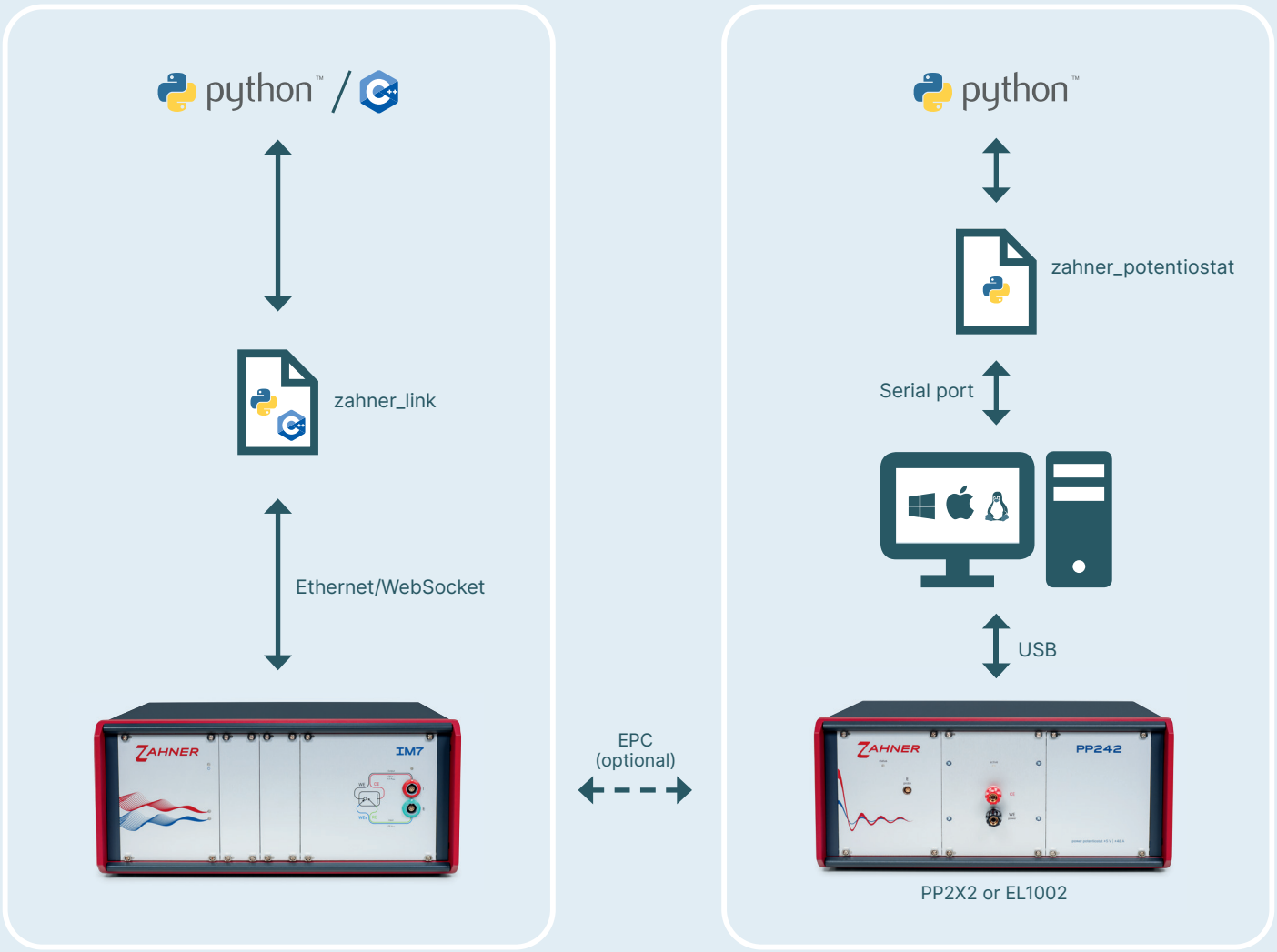
Remote Integration Possible With:

- C++
- Python
- WebSocket

> "FROM REMOTE MEASUREMENT TO REMOTE DATA ANALYSIS"

Automate Your Electrochemistry

Integrate our potentiostats into your test bench for seamless operation. Zahner offers flexible remote control of the devices with ease. By integrating multiple potentiostats into a test bench, the user can create a high-quality multichannel system.



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