

ECA-LP1 Potentiostat, Galvanostat and Impedance Analyser



Features

Configuration 1 channel, 3-electrode with separate WE sense and dedicated GND connection

Power USB-C PD adaptor with PPS support, operated at 20 V

Potential Range/Resolution ± 5 V applied/measured; 0.1 mV programmable, output and measurement

Scan/Sampling 50 V/s maximum scan rate at 5 mV steps; sampling up to 10 kS/s

WE-CE Compliance Voltage Up to ± 7.5 V

Current Measurement Ranges ± 50 nA to ± 250 mA, six ranges; manual selection outside EIS

Galvanostatic Source Ranges ± 100 μ A to ± 250 mA, four manually selectable ranges

Best Current Resolution 0.1 pA; see detailed conditions

Maximum Output Current ± 250 mA continuous

EIS Frequency Generation 10 μ Hz to 1 MHz

Tested EIS Span 0.1 Hz to 1 MHz

AC Excitation 1 mV to 350 mV RMS

Multi-sine 2–10 tones, maximum tone frequency 10 Hz

Signal Chain 80 MSPS DAC; ADC 24-bit up to 100 S/s / 16-bit up to 10 kS/s

Onboard Storage 128 GB internal, USB Mass Storage access

Compact 100×100×30 mm aluminium enclosure

Software Sensitify Studio for Windows and macOS

Data Analysis Circuit fitting and peak detection built in

Current Protection Software trip and hardware current limiting

Applications

- Electrochemical sensor development
- Corrosion measurement
- Battery characterisation
- General EIS and impedance analysis

Methods

Cyclic Voltammetry (CV)

Linear Sweep Voltammetry (LSV)

Differential Pulse Voltammetry (DPV)

Square Wave Voltammetry (SWV)

Normal Pulse Voltammetry (NPV)

Chronoamperometry (CA)

Chronopotentiometry (CP)

Open Circuit Potential (OCP)

Electrochemical Impedance Spectroscopy (EIS)

Multi-sine EIS

Galvanostatic EIS (gEIS)

Galvanostatic Intermittent Titration (GITT)

Potentiostatic Intermittent Titration (PITT)

Battery Cycling

Why ECA-LP1

Standalone experiments

Run measurements directly on the instrument with 128 GB internal storage. Disconnect the host and retrieve the complete dataset later. Long-duration CV cycling, GITT, PITT and battery cycling do not depend on a computer remaining connected or awake.

No account, activation or subscription

Sensitify Studio is included with every instrument. Equivalent-circuit fitting, automatic peak detection, experiment sequencing and the Publication Workbench are available without paid modules or recurring fees.

Bench capability, compact footprint

± 5 V WE-RE control, ± 250 mA continuous output and EIS up to 1 MHz in a 100×100×30 mm aluminium enclosure, powered by a single USB-C PD adaptor with PPS support, operated at 20 V. No proprietary power supply or rack installation is required.

Values identified as typical were characterised at $23 \pm 5^\circ\text{C}$ after factory calibration, using the supplied 1 m shielded cell cable. No defined warm-up period is required.

General

Type	Potentiostat / Galvanostat / EIS
Channels	1
Cell configuration	3-electrode with separate WE sense
Cell connections	WE, WE Sense, RE, CE and GND
Power input	USB-C PD adaptor with PPS support, operated at 20 V
Typical power consumption	1.5 W
Maximum continuous power consumption	5 W
Peak input current	Up to 0.4 A transient
Recommended adaptor	20 V-capable USB-C PD adaptor with PPS support, ≥ 10 W
Host interface	USB-C, USB Full-Speed
Firmware update	Manual update over USB
Driver installation	Not required on supported Windows and macOS systems
Onboard storage	128 GB internal
Storage host access	USB Mass Storage
User-replaceable storage	No
Dimensions	100 × 100 × 30 mm
Enclosure	Aluminium
Operating temperature	10–35 °C
Specification temperature	$23 \pm 5^\circ\text{C}$
Cell cable	1 m shielded cell cable with locking circular connector, banana connectors and detachable crocodile clips
Warm-up time	No defined warm-up period required
Factory calibration	Performed on every instrument
Calibration coefficients	Stored internally
Final functional verification ¹	Performed before shipment

¹ Final verification covers potential and current operation, EIS functionality, USB communication and internal storage.

Potential Control and Measurement

Applied WE–RE potential range	± 5 V
Measured WE–RE potential range	± 5 V
Minimum programmable step	0.1 mV
Calibrated output resolution	0.1 mV
Potential measurement resolution	0.1 mV
Typical post-calibration residual error ¹	≤ 0.1 mV
Reference electrode input impedance ²	1 T Ω 2.1 pF typical
Calibrated reference electrode input bias current ²	1–3 pA typical at 25 °C
WE–CE compliance-voltage headroom	Up to ± 7.5 V
Maximum continuous output current	± 250 mA
DAC resolution	2 × 16-bit (fine and coarse)

¹ The stated residual error is typical post-calibration performance observed across the programmable potential range using a Keithley DMM6500 after factory calibration. It is not a guaranteed total error over temperature, ageing, load or production variation.

² Reference-electrode input values apply at the instrument input after factory calibration, with the cell cable disconnected.

Potential Acquisition

24-bit acquisition mode	Up to 100 S/s
16-bit fast acquisition mode	Up to 10 kS/s
Maximum stored data rate	10 kS/s
Maximum CV scan rate ¹	50 V/s
Potential step at maximum scan rate	5 mV
Update rate at maximum scan rate	10 kS/s

¹ Maximum scan rate is available across the full ± 5 V programmable potential range.

Current Measurement and Control

Current ranges	± 250 mA, ± 10 mA, ± 1 mA, ± 100 μ A, ± 10 μ A, ± 50 nA
Range selection	Manual outside EIS
Maximum continuous output current	± 250 mA, bipolar
Hardware current limit ¹	Approximately 0.3 A, protection function
Software over-current protection	User-configurable automatic measurement stop
Stop command	Disables WE–CE output
Power-off cell state	High impedance
Host-disconnection behaviour	Active regulation and internal recording continue
WE–RE applied and measured potential range	± 5 V
WE–CE compliance-voltage headroom	Up to ± 7.5 V
Best calibrated resolution ²	0.1 pA on ± 50 nA range, ≤ 20 samples/s
Analogue measurement bandwidth ³	Range-dependent; see table below

Typical Analogue Current-Measurement Bandwidth

± 250 mA	1 MHz
± 10 mA	1 MHz
± 1 mA	1 MHz
± 100 μ A	500 kHz
± 10 μ A	100 kHz
± 50 nA	100 Hz

¹ The hardware current limit is a protection function and does not increase the specified ± 250 mA continuous output-current rating.

² The 0.1 pA value represents calibrated digital current resolution, not RMS noise or minimum detectable current. It applies to the ± 50 nA range at sampling rates up to 20 samples/s with the built-in low-pass filter active.

³ The bandwidth values describe the analogue current-measurement signal chain, not the maximum stored time-domain data rate.

Impedance Measurement

Frequency generation range	10 μ Hz to 1 MHz
Experimentally tested EIS frequency span	0.1 Hz to 1 MHz
Tested impedance span	1 Ω to 100 k Ω
Single-sine excitation amplitude ¹	1 mV to 350 mV RMS
Potentiostatic DC bias ¹	± 5 V
EIS at OCP	Supported
Current-range selection ²	Automatic, six measurement ranges
Lock-in detection	Automatic digital/analogue lock-in crossover at 10 Hz
Typical post-calibration magnitude error ³	$\leq 1\%$
Typical post-calibration phase error ³	$\leq 0.5^\circ$
DDS reference clock	80 MHz
Frequency tuning	28-bit DDS
Clock tolerance	0.1%
Typical measured frequency error	$\leq 0.1\%$

¹ The AC excitation is superimposed on the selected DC bias. The instantaneous combined waveform must remain within the ± 5 V WE–RE applied-potential range. For a given load, the excitation amplitude is constrained by the ± 250 mA continuous output-current rating; the maximum excitation amplitude and minimum tested impedance are not simultaneous operating limits.

² During EIS, all six current-measurement ranges are available. Range selection is automatic and may occur between frequency points during a sweep.

³ Magnitude and phase error values are typical post-calibration performance from a factory-calibrated instrument measured at $23 \pm 5^\circ\text{C}$ using the supplied 1 m shielded cell cable, pure resistive standards from 1 Ω to 100 k Ω , 1 Hz to 100 kHz, 10 mV RMS excitation and automatic current-range selection. These values are not guaranteed for all complex loads, environmental conditions or the full frequency-generation range.

Multi-sine EIS

Simultaneous tones	2 to 10
Maximum tone frequency	10 Hz
Individual tone frequencies	User-selectable
Logarithmic frequency spacing	Supported
Total excitation amplitude	1 mV to 350 mV RMS
Amplitude definition	RMS of the complete combined multi-sine waveform
Crest-factor optimisation	Supported
Phase strategies	Schroeder, random and zero phase
Multi-sine detection	Digital

Multi-sine EIS is intended to reduce measurement time in low-frequency experiments by exciting multiple frequencies simultaneously; its 10 Hz maximum tone frequency does not limit the single-sine EIS frequency range.

Galvanostatic Control

Galvanostatic source ranges¹	± 250 mA, ± 10 mA, ± 1 mA, ± 100 μ A
Lowest source range	± 100 μ A
Source-range selection	Manual
Minimum programmable current step	0.1% of selected full-scale range
Typical post-calibration current-source gain error²	$\leq 0.1\%$ of programmed value
Maximum continuous current	± 250 mA, bipolar
WE–CE compliance-voltage headroom	Up to ± 7.5 V
Maximum current-command update rate	10 kS/s
24-bit potential acquisition	Up to 100 S/s
16-bit fast potential acquisition	Up to 10 kS/s

¹ The ± 10 μ A and ± 50 nA ranges are current-measurement ranges and are not available for galvanostatic current sourcing.

² The stated current-source gain error is typical post-calibration performance. It is not a guaranteed total accuracy specification over temperature, ageing, load, time or production variation. Zero-current offset is not included in this gain-error specification. Temperature drift and long-term drift are not yet included.

Galvanostatic Programming Resolution¹

± 250 mA	250 μ A
± 10 mA	10 μ A
± 1 mA	1 μ A
± 100 μ A	100 nA

¹ Programming resolution is 0.1% of the selected source-range full-scale magnitude.

Galvanostatic Safety and Cutoff Behaviour

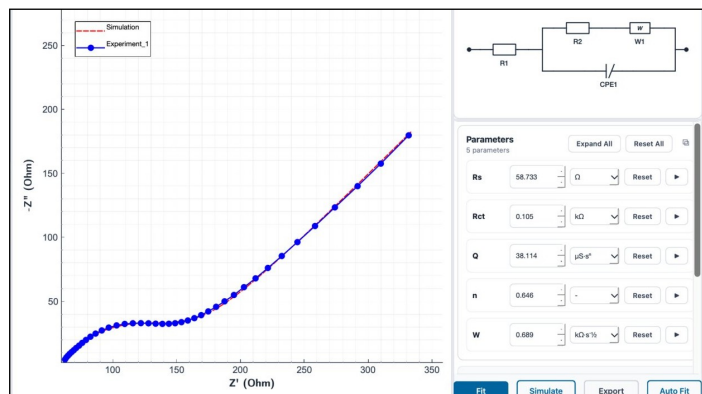
Compliance response	WE–CE output voltage saturates at the compliance limit; actual current may fall below the setpoint. Compliance limitation alone does not stop the measurement.
Over-current response	Software-controlled automatic measurement stop.
Rest modes	Selectable 0 A active control or OCP.
Potential cutoffs	User-configurable upper and lower limits.
Time cutoff	User-configurable, 1 ms setting resolution.
Charge/capacity cutoff	User-configurable.

Characterisation status

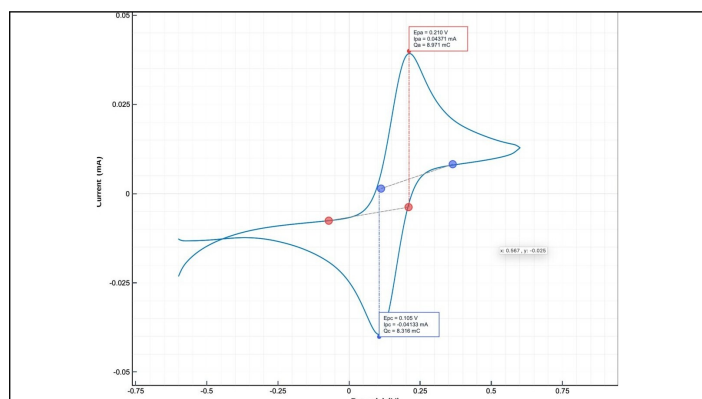
Detailed performance characterisation values are based on measurements from one characterised instrument. Each production unit is individually factory calibrated and functionally verified.

Sensitify Studio

Sensitify Studio is the free measurement and analysis application bundled with every ECA instrument. It controls the ECA-LP1 over USB, provides real-time plotting, and records measurement data simultaneously to the host computer and internal instrument storage. An account, activation or subscription is not required for measurement, data analysis or normal instrument use.



Equivalent-circuit fitting



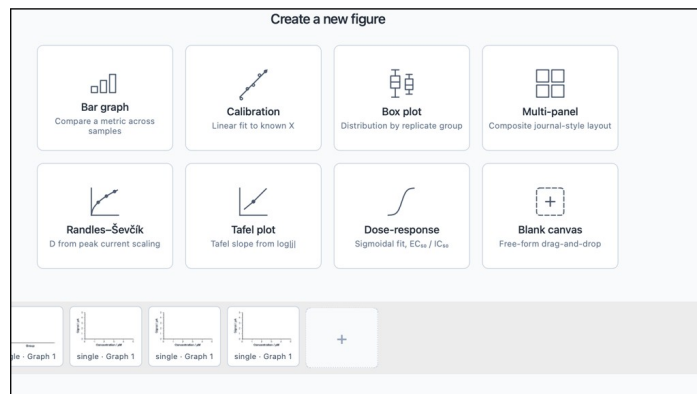
Automatic CV/DPV/SWV peak detection

Analysis and Workflow Capabilities

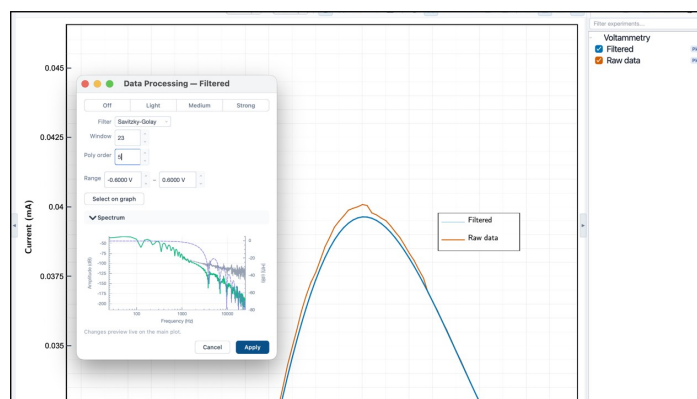
- Equivalent-circuit fitting: Randles, Randles-CPE, Randles-CPE-Warburg, Voigt 2RC/2CPE and custom circuits
- Automatic peak-current and peak-potential detection for CV, DPV and SWV
- Charge integration
- Calibration curves, Randles–Ševčík analysis, Tafel analysis, dose-response fitting and box plots
- Non-destructive and reversible Savitzky–Golay, moving-average, median and low-pass filtering
- Live filter frequency-response preview
- Publication Workbench for Nyquist, Bode, CV, DPV, SWV and calibration plots from multiple experiments
- Studio-based Experiment Sequencer for automated multi-step and conditional measurement protocols

Software Licence and Operation

Software licence	Included free of charge
Subscription	Not required
Account	Not required
Activation	Not required
Firmware update	Manual update over USB



Publication Workbench



Non-destructive filtering preview

Data Handling and Export

Native file format	.stfy
File replay	Open and replay .stfy files produced by supported ECA instruments
Recording destinations	Host computer and internal storage simultaneously
Maximum host data transfer	Up to 10 kS/s
Internal background recording	Supported
Data export	CSV, ASCII/TXT, XLSX and MATLAB MAT-file (.mat)
Figure export	PNG and PDF
Raw data preservation	Yes; filtering is non-destructive

System requirements

- Windows 10 or later, or macOS 12 or later on Apple silicon
- Free USB-C or USB-A host port (USB-C on the instrument side)
- 500 MB of disk space
- No additional driver installation required

Safety and Intended Use

For research and laboratory use only. Not intended for clinical diagnostic, medical or life-support applications. The settable and measured WE-RE potential range is $\pm 5\text{V}$. Up to $\pm 7.5\text{V}$ may be developed between WE and CE as compliance-voltage headroom to maintain the selected WE-RE potential under load. The $\pm 7.5\text{V}$ compliance value is not an extended WE-RE setpoint or measurement range.

Active experiments continue after loss of USB host communication. Use the software Stop command before changing cell connections; if the host is unavailable, remove instrument power before changing cell connections. Observe the specified electrode connections and polarity. Continuous short-circuit operation is not permitted.

Maximum continuous output current is $\pm 250\text{mA}$. When testing rechargeable or high-energy cells, use appropriate external battery protection, monitoring and containment. The ECA-LP1 does not replace a BMS or cell-safety system.

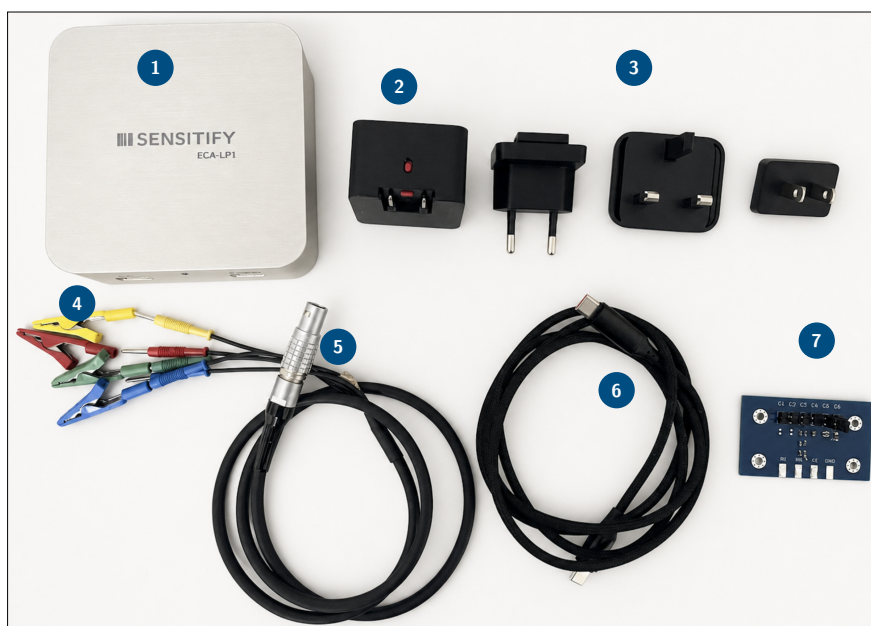
Ordering Information

Part number	ECA-LP1
Description	Potentiostat / Galvanostat / EIS Analyser
Configuration	1 channel, 3-electrode with separate WE sense
Software	Sensitify Studio included
Standard cell cable	1 m shielded cell cable

Accessories & Spares

Spare cell cable	1 m shielded cell cable with locking circular connector
Spare power adaptor	20 V-capable USB-C PD adaptor with PPS support
SPE fixture	Fixture for screen-printed electrodes
IDE fixture	Fixture for interdigitated and thin-film electrodes
Interdigitated gold electrodes	Pack of 50

In the Box



- 1 ECA-LP1 instrument
- 2 20 V-capable USB-C PD adaptor with PPS support
- 3 Regional mains plug
- 4 Banana connectors with detachable crocodile clips
- 5 1 m shielded cell cable
- 6 USB-C host cable
- 7 Dummy cell

Carrying case included but not shown. Online Quick Start Guide available through Documentation.

Contact & Support

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LinkedIn – [linkedin.com/company/sensitify](https://www.linkedin.com/company/sensitify)

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