

micrux  
TECHNOLOGIES

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## MicruX<sup>®</sup> ECStat

*Bipotentiostat / Galvanostat / ZRA / EIS Analyzer*



MicruX ECStat (ref. ECSTAT2020) is a USB-powered All-in-One Electrochemical Workstation, including a Bipotentiostat / Galvanostat with built-in Impedance Analyzer, in a very compact and portable equipment.



- » Dimensions: 160 x 100 x 45 mm (L x W x H).
- » USB-powered
- » Control PC software - MicruX EC Manager
- » Interfacing: USB-C
- » LED indicators: power on, cell on
- » Built-in FRA/EIS analyzer from 10  $\mu$ Hz to 1 MHz
- » Current ranges: 100 pA to 10 mA (max. current:  $\pm$  30 mA)
- » Operating modes: bipotentiostat, potentiostat, ZRA, galvanostat, PEIS analyzer

## » MicruX<sup>®</sup> ECStat – Available Techniques

ECStat includes more than 25 electroanalytical techniques for voltammetric, amperometric, potentiometric and impedance spectroscopy analysis.

### Voltammetry

CV	Cyclic Voltammetry
FSCV	Fast-Scan Cyclic Voltammetry
LSV	Linear Sweep Voltammetry
DPV	Differential Pulse Voltammetry
NPV	Normal Pulse Voltammetry
SWV	Square Wave Voltammetry
ACV	Alternating Current Voltammetry

### Amperometry

AD	Single-Potential DC Amperometry
ZRA	Zero Resistance Amperometry
FA	Fast Amperometry
PAD	Pulsed Amperometric Detection
DPA	Differential Pulse Amperometry
MSA	Multi-Step Amperometry

### Potentiometry

ZCP	Zero Current Potentiometry
PD	Potentiometric Detection
MSP	Multi-Step Potentiometry
PSA	Potentiometric Stripping Analysis

### Impedance (Potentiostatic Mode)

PFP	PEIS – Fixed Potential
PSP	PEIS – Scan Potential
PTS	PEIS – Time Scan

### Bipotentiostat

CV-CV* / CV-AD*
LSV-LSV* / LSV-AD*
AD-AD*
MSA-MSA* / MSA-AD*

\*WE2 potential is fixed or offset from WE1 potential

Note: voltammetric techniques can be used for stripping voltammetry in combination of a pretreatment procedure.



## » MicruX<sup>®</sup> ECStat - Measurement Specifications

### General Pretreatment

Conditioning time	0 – 1500 s
Deposition time	0 – 1500 s
Equilibration time	0 – 1500 s

### General Parameters

Start, Stop, Vertex potential	-10 V to +10 V
Step potential	0.0075 mV to 250 mV
Pulse potential	0.0075 mV to 250 mV

### Specific Parameters

CV, LSV	Scan rate:	0.01 mV/s to 500 V/s
DPV, NPV	Scan rate:	0.02 mV/s to 25 V/s
	Pulse time:	1 ms to 300 ms
SWV, ACV	Frequency:	1 Hz to 2000 Hz
AD, PD, ZRA, ZCP	Interval time:	0.25 ms to 300 s
	Maximum run time:	1 000 000 s (several days)
FA	Interval time:	0.02 ms to 1 s
	Maximum run time:	30 s
DPA	Interval time:	50 ms to 10 s
	Pulse time:	1 ms to 1 s
	Maximum run time:	640 000 s (several days)
PAD	Pulse time:	100 ms to 2 s
	Run time:	2 s to 1 000 000 s
MSA, MSP	Interval time:	0.4 ms to 300 s
	Number of steps:	1 to 255
	Number of cycles:	1 to 20000
	Maximum run time:	1 000 000 s (several days)
PSA	Potential limit:	±10 V
	Run time:	1 s to 1 000 000 s

*Note: Specifications subject to change without prior notice*



## » MicruX<sup>®</sup> ECStat features

### General

- » DC-potential range ± 10 V
- » Compliance voltage ± 10 V
- » Maximum current ± 30 mA

### Potentiostat

- » Applied DC-potential resolution 75 µV
- » Applied potential accuracy ≤ 0.1% ± 1 mV offset
- » Current ranges 100 pA to 10 mA (9 ranges)
- » Current accuracy ≤ 0.1 % (at Full Scale Range)
- » Measured current resolution 0.006 % of current range (5 fA on 100 pA range)

### Galvanostat

- » Current ranges 1 nA to 10 mA (8 ranges)
- » Applied DC-current range ± 6 times applied current range
- » Applied DC-current resolution 0.005 % of applied current range
- » Measured DC-potential accuracy 75 µV at ± 10 V  
7.5 µV at ± 1 V  
0.75 µV at ± 0.1 V

### EIS (impedance measurements)

- » Frequency range 10 µHz to 1 MHz
- » AC-amplitude range 1 mV to 250 mV rms, or 0.6 V p-p

### Electrometer

- » Electrometer amplifier input > 1 TΩ // 10 pF
- » Bandwidth 1 MHz

### Other

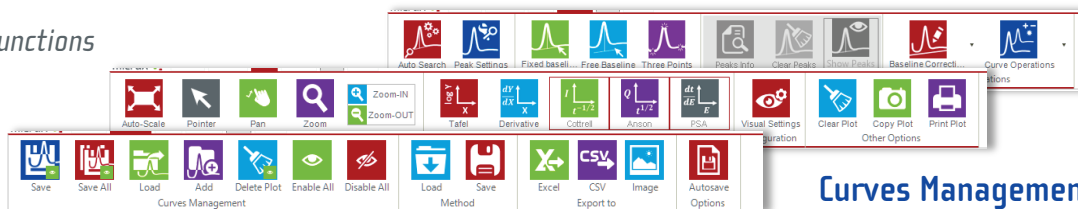
- » External inputs/outputs (D-Sub 15) Iout, Eout  
1 Analog input (± 10V, 18 bit)  
1 Analog output (0-10 V, 12 bit, 1 kOhm output impedance)  
4 Digital outputs (5 V)  
1 Digital input (5 V)
- » Housing Aluminum case: 160 x 100 x 45 mm<sup>3</sup>
- » Weight 0,5 Kg
- » Temperature range 0 °C to + 50 °C
- » Power supply USB power supply
- » Communication USB-C



MicruX<sup>®</sup> EC Manager is a modern graphical user interface for the control of the instrument from a PC, enabling real-time plotting, storage and analysis of the results.

## Graphical Ribbon Bar Menu

Fast access to all the functions



## Curves Management

The screenshot displays the main software interface. On the left is the 'Experiment Configuration' panel with settings for Cyclic Voltammetry (E start, Evtx1, Evtx2, E step, Scan rate, Scans) and additional settings like 'Cell on' and 'Ecell (V)'. The central area features a 'Recording Plot' showing current (pA) vs. potential (V) with multiple colored curves. Below it is a 'BIPOT Plot' showing current (pA) vs. potential (V) for a Bipotentiometric experiment. On the right, the 'Curves - Methods' panel lists 10 curves and provides a 'Selected Method' dropdown menu with options: Voltammetry, CV-Experiment (1), Amperometry, AD, Impedance, and PSP-Freq. Scan.

FREE upgrades FOREVER

## One-click Methods

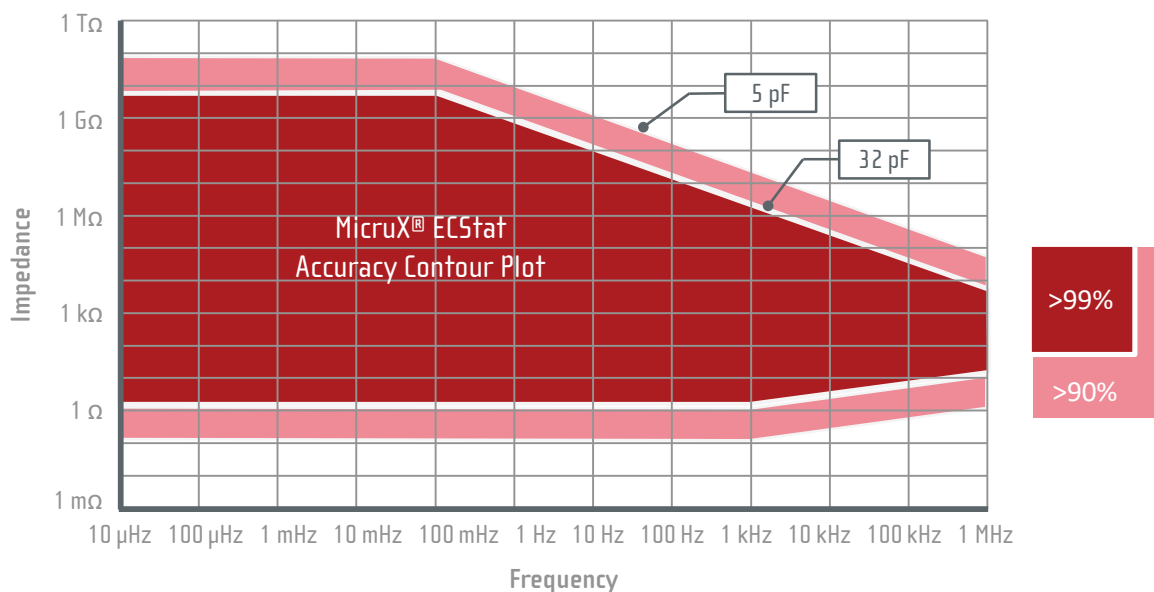
Fast load of your favorite methods

- » Multiple curve options: Save, Load, Export to Excel/CSV/Image
- » Peaks search, baseline corrections, curve operations
- » Multiple EIS spectrum plotting
- » Export EIS data for analysis





## » EIS Contour Accuracy Plot



Note: The accuracy contour plot is determined under lab conditions and should be just used for reference purposes. Please note that the true limits of an impedance measurement are affected by all components in the experimental set-up, such as cables, the environment, and the cell.

## » MicruX<sup>®</sup> ECStat - Standard Pack

Basic content:

- » Bipotenciostat/Galvanostat/Impedance Analyzer
- » Plastic briefcase
- » Sensor cable with 2 mm banana plugs (+ Alligator clips)
- » USB-C cable
- » Y-USB cable (for BIPOT extra power)
- » Dummy cell
- » MicruX<sup>®</sup> EC Manager software

Additional accessories:

- » Sensor cable with miniUSB plug for MicruX platforms
- » Electrode Pack (30 thin-film electrodes + drop-cell interface)





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