

*Multi*EmStat³ and 3+TM

MULTI-CHANNEL POTENTIOSTAT



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MultiEmStat3: Economical Solution for High Productivity

The MultiEmStat is a versatile multi-channel potentiostat with 4, 8, or 12 independent EmStat potentiostats. The channels can perform experiments independently of each other. The MultiEmStat is conveniently connected using a single USB connection and controlled by the MultiTrace software for Windows.

Each potentiostat has eight (EmStat3) or nine (EmStat3+) current ranges: 1 nA to 10 mA/100 mA with a resolution of 1 pA at the lowest current range. The individual potentiostats automatically select the optimal current range.

MultiEmStat3 with 4 channels
(footprint of 11 x 8.5 cm)



MultiEmStat3 / 3+ with
4, 8 or 12 channels



Supported Techniques

The MultiEmStat3 supports the following techniques:

Voltammetric techniques

- | | |
|----------------------------------|-----|
| ▪ Linear Sweep Voltammetry | LSV |
| ▪ Differential Pulse Voltammetry | DPV |
| ▪ Square Wave Voltammetry | SWV |
| ▪ Normal Pulse Voltammetry | NPV |
| ▪ Cyclic Voltammetry | CV |

Note: the above techniques can also be used for stripping voltammetry

Techniques as a function of time

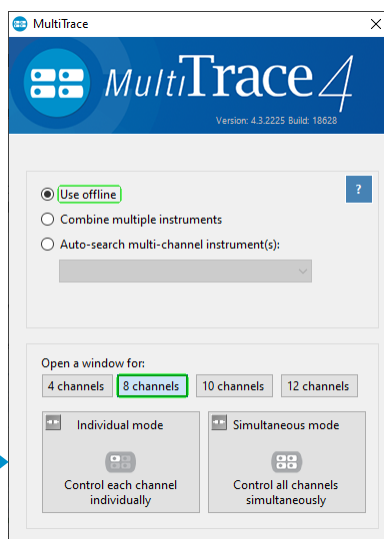
- | | |
|---|------|
| ▪ Chronoamperometry | CA |
| ▪ Pulsed Amperometric Detection | PAD |
| ▪ Multiple Pulse Amperometric Detection | MPAD |
| ▪ Zero Resistance Amperometry | ZRA |
| ▪ MultiStep Amperometry | MA |
| ▪ Mixed Mode ¹ | MM |
| ▪ Open Circuit Potentiometry | OCP |

¹ Mixed Mode is partially available for MultiEmStat3. Due to the hardware limitations of the MultiEmStat3 galvanostatic and EIS steps are not supported.

See page 7 for instrument specifications.

MultiTrace: software for Windows

The MultiEmStat3 comes with MultiTrace for Windows. MultiTrace allows the instrument to be controlled in two different modes: Individual and Simultaneous channel control mode. This mode can be selected in the start-up window of MultiTrace.



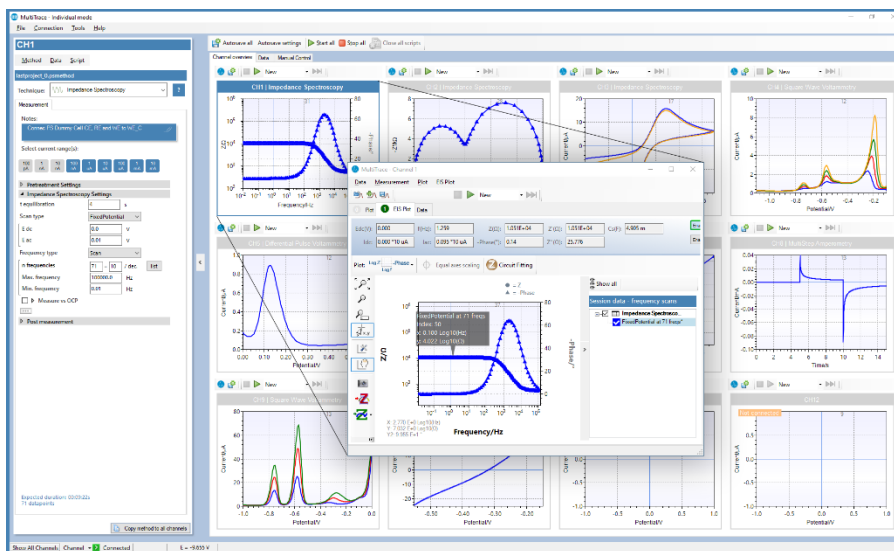
Individual Mode:
where each channel can run a measurement or script independently from the other channels.

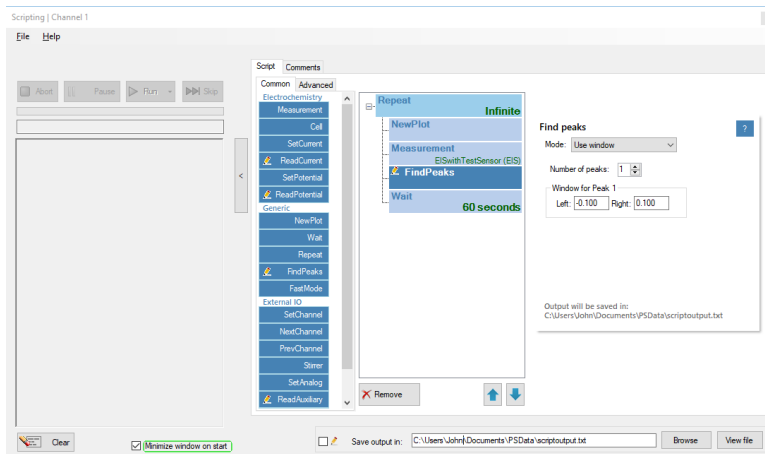
Simultaneous Mode:
where all channels run the same measurement.

Individual Mode

The individual mode gives an overview of all channels. Each channel can be selected separately and can run a measurement independently in parallel with other channels.

You can also run a script for a sequence of measurements and other actions on each channel.





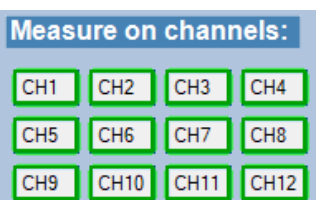
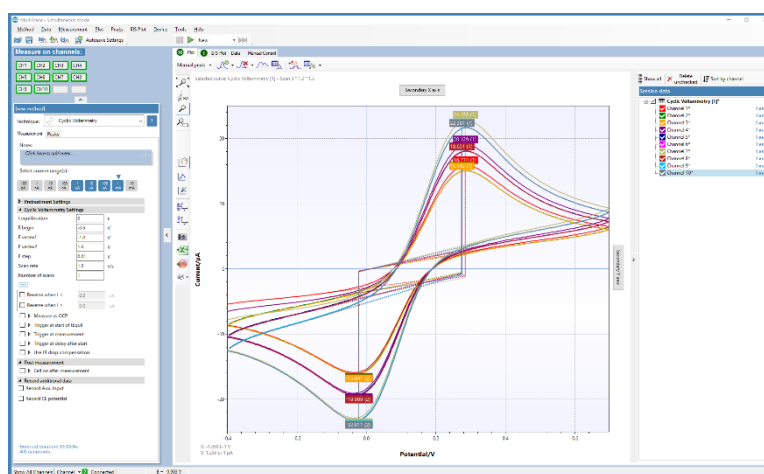
Scripting

The Individual mode of MultiTrace also supports the option to run a sequence of measurements on a specific channel by using Scripting. Such a sequence can include different techniques and provides control commands for manual cell control or digital input or output lines.

Simultaneous Mode

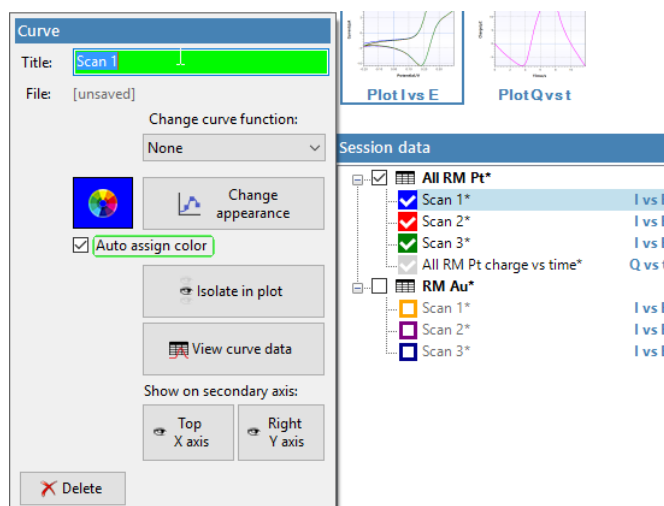
In the Simultaneous Mode the MultiEmStat3 works with all channels running the same measurement in parallel at the same time.

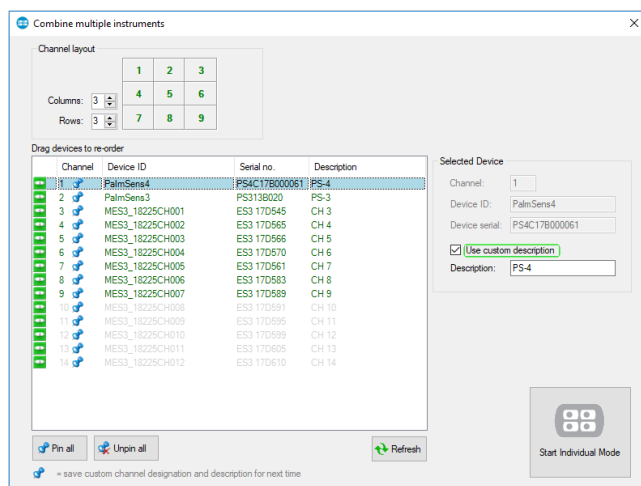
There is only one active method in the Method Editor which is started on all channels simultaneously upon start. All results are presented as overlays in the same plot.



This panel in the main screen contains a toggle button for each channel determines which channels are participating in the measurement.

Pop-up window shown when clicking a Curve in the legend.



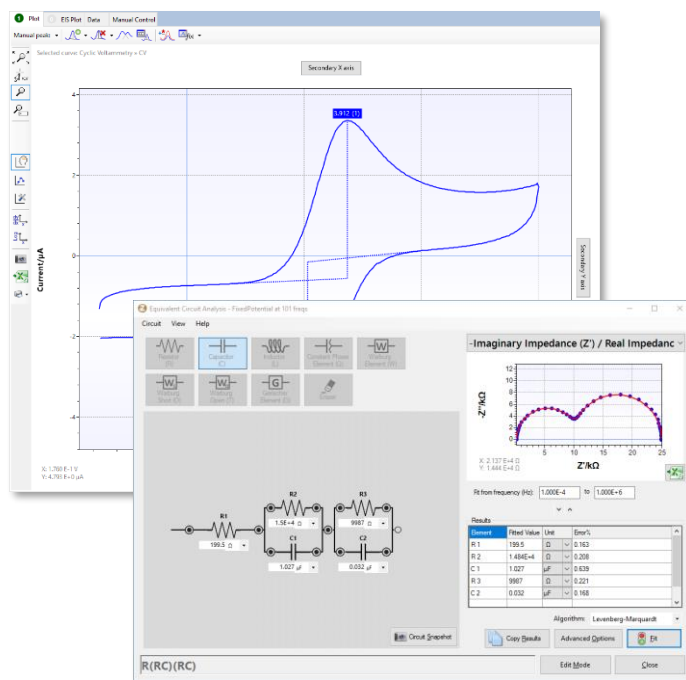


Combining different instruments

MultiTrace supports all instruments provided by PalmSens BV. A collection of different instruments can be combined for control by MultiTrace in both Individual and Simultaneous mode. Either multiple multi-channel or single-channel instruments can be combined.

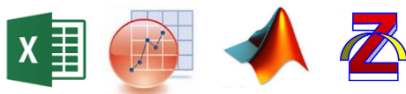
Other functions in MultiTrace

- Equivalent Circuit Fitting
- Automatic peak search
- Scripting (on each channel)
- Automatic data saving
- Open your data in Origin and Excel with one click of a button
- Save all available curves, measurement data and methods to a single file
- Dynamic feedback on method parameters



Integration with third party software:

- Excel
- Origin
- Matlab
- ZView



System requirements

Minimum PC requirements are:

- Windows 7, 8, or 10
- 1 GHz or faster 32-bit (x86) or 64-bit (x64) processor with at least 2 processor cores (4 or more cores recommended)
- 2 GB RAM (32-bit) or 4 GB RAM (64-bit)
- Screen resolution of at least 1280 x 768 pixels (higher is recommended)

For more information about software visit

www.palmsens.com/software

MultiEmStat3 Measurement Specifications

General pretreatment

Apply conditioning, deposition, or initial potential for 0 – 1600 s

General voltammetric parameters

Model	MultiEmStat3	MultiEmStat3+
Potential range	-3 V to +3 V	-4 V to +4 V
Step potential	0.125 mV to 250 mV	0.125 mV to 250 mV
Pulse potential	0.125 mV to 250 mV	0.125 mV to 250 mV

Limits of some technique-specific parameters

Normal Pulse and Differential Pulse Voltammetry	Scan rate:	0.025 mV/s (0.125 mV step) to 50 mV/s (5 mV step)
	Pulse time:	5 ms to 300 ms
Square Wave Voltammetry¹ and AC Voltammetry	Frequency:	1 Hz to 500 Hz ¹
Linear Sweep and Cyclic Voltammetry	Scan rate:	0.01 mV/s (0.1 mV step) to 5 V/s (5 mV step)
ChronoAmperometry, ChronoPotentiometry and Open Circuit Potentiometry	Interval time:	1 ms to 300 s
	Maximum run time:	1000000 s (> 10 days at 300 s interval)
Pulsed Amperometric Detection	Interval time:	50 ms to 300 s
	Pulse time:	1 ms to 1 s
	Maximum run time:	> hours
Multiple Pulse Amperometric Detection	Pulse times:	100 ms to 2 s
	Run time:	10 s to hours
	Number of potential levels:	3
Multistep Amperometry, Multistep Potentiometry and Mixed Mode	Interval time:	1 ms to 30 s
	Number of potential levels:	1 to 255
	Number of cycles:	1 to 20000
	Maximum run time:	> 1 year

¹ MultiTrace provides the option to measure forward and reverse currents separately.

MultiEmStat3 System Specifications

General	MultiEmStat3	MultiEmStat3+
▪ dc-potential range	$\pm 3.000 \text{ V}$	$\pm 4.000 \text{ V}$
▪ compliance voltage	$\pm 5 \text{ V}$	$\pm 8 \text{ V}$
▪ maximum current	$\pm 20 \text{ mA}$ (typical)	$\pm 100 \text{ mA}$ (typical)
▪ max. acquisition rate	150000 points/s	

Potentiostat	MultiEmStat3	MultiEmStat3+
▪ applied dc-potential resolution	0.1 mV	0.125 mV
▪ applied potential accuracy	$\leq 0.2\%$ $\pm 2 \text{ mV}$ offset	$\leq 0.3\%$ $\pm 3 \text{ mV}$ offset
▪ current ranges	1 nA to 10 mA (8 ranges)	1 nA to 100 mA (9 ranges)
▪ measured current accuracy	$\leq 0.5\%$ of current range at 10 nA and $\leq 1\%$ at 1 nA $\leq 0.2\%$ at 100 nA to 100 μA $\leq 0.5\%$ at 1 mA, 10 mA and 100 mA	
▪ measured current resolution	0.1 % of current range 1 pA on lowest current range	

Electrometer		
▪ electrometer amplifier input	$> 100 \text{ G}\Omega // 4 \text{ pF}$	
▪ rise time	100 μs	

Other	MultiEmStat3 4-channel	MultiEmStat3+
▪ housing	115 x 85 x 35 mm ³	120 x 210 x 75 mm ³
▪ weight	+/- 260 g	+/- 2 kg
▪ power supply	external 5 V AC/DC adapter	external 12 V AC/DC adapter
▪ electrode connections	2 mm banana pins for RE, WE, CE and GND	2 mm banana pins for RE, WE, CE, Sense and GND
▪ communication	USB	

Galvanic Channel Isolation

The MultiEmStat3 and MultiEmStat3+ are optionally available with galvanic isolated channels.

Please don't hesitate to contact PalmSens for more details:
info@palmsens.com

PalmSens BV
The Netherlands
www.palmsens.com

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