



Electrochemistry instruments



Founded in 1983 on little more than inspiration and hard work, Bio-Logic is now an international company, that designs, manufactures and sells high performance measurement instruments for electrochemistry, battery testing, fuel cell and material testing, rapid kinetics and photosynthesis, all around the world.

Drawing on years of experience, innovative new ideas, solid values and commitment to quality and reliability, Bio-Logic continues to develop products with the applications and customer needs in mind.





Because **what you do is what is important**, qualified sales representatives and degreed application engineers work with you to create simple, efficient and reliable solutions. They are able to understand what you want to achieve and have the capacity to transfer this into instruments & software that bring you the best user experience and the right modularity to drive your specific experiments.

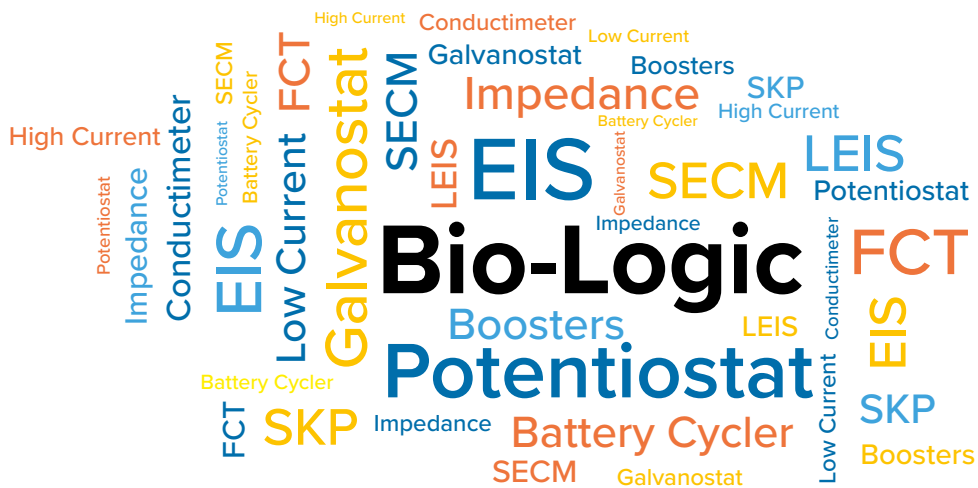
We know that **your time** is as **precious** as your object of study, so we take extra pride in developing products that are easy to use, powerful and reliable.

Collaborating with you, we help to simplify the exciting and sometimes complex challenge of assessing your research results meeting your measurement expectations with imagination, innovation and a superb attention to detail.

We also know that things are moving fast and your instruments have to be versatile and modular enough to adapt to your moving environment.

Our goal is that you are able to **enjoy your experience** with long-lasting reliable Bio-Logic instruments. An experienced and friendly sales support and after-sales service staff serves your teams with individual attention. We are dedicated to providing quality technical support and service to all of our customers, and being there when you need us most.

A unique and complete products range



Modular systems

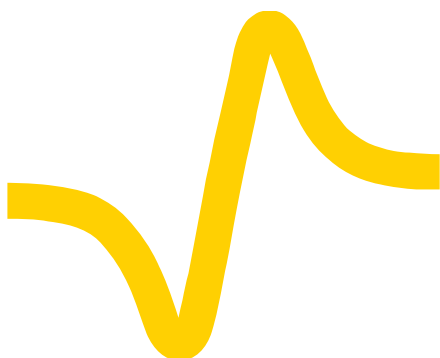


- Single to multichannel
- High current boosters up to 800 A
- Extended voltage range up to 60 V
- Low current options (down to aA)
- Multiple user systems
- ARG (Analogic Ramp Generator) to perform analog voltage ramp
- Scanning workstations with up to 9 different local techniques (dc-SECM, ac-SECM, LEIS, SKP, SVET...)
- Fully featured impedance analyzer with temperature control

Controlled by a powerful suite of software



- Intuitive user interface
- Pre-set techniques for usual electrochemical applications
- Multi-technique experiment builder
- External devices control
- Multiple graph display
- Data analysis & fit
- Safety & experimental limits
- Software calibration



Electrochemical Impedance Spectroscopy

Bio-Logic is a leader in Electrochemical Impedance Spectroscopy (EIS). Bio-Logic contributed to put EIS within every researcher's reach, by making it available on all its instruments.

Bio-Logic provides built-in EIS to make it easy and smooth for the user to mix DC and AC techniques.

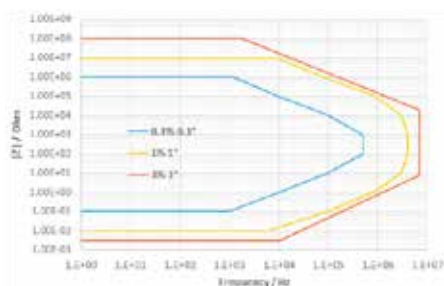
Controlling techniques

AC sine waves can be superimposed on a DC potential or a DC current value. Additional techniques are available that impose the sine wave on a various potential (SPEIS, also known as Mott Schottky technique) or a current (SGEIS) values.

Finally our EIS techniques can be sequenced to apply different defined conditions during the frequency sweep.

Accuracy

Accuracy is given by the error observed on the phase and on the magnitude. Most of our potentiostats are specified with 1%, 1° accuracy below 500 kHz. SP-300 potentiostat provides the highest performance reading 0.3%, 0.3°. Because it's not always possible to perform measurement very close to the instrument, this contour plot has been performed with the SP-300 standard 1.75 m cables.



EIS contour plot of SP-300 with standard cable (1.75 m)

Modeling

Bio-Logic software offers Z Fit, a modeling tool for equivalent circuit fitting. 13 elements and two minimization algorithms (DownHill Simplex and Levenberg-Marquardt) are available to analyse impedance data.

■ Patented and unique transient state correction technique

- **Drift** correction

■ Innovative and unique measurement quality indicators

- **THD**, Total Harmonic Distortion, quantifies the linearity of the response
- **NSD**, Non-Stationary Distortion, indicates the effect of time-variance and transient regime
- **NSR**, Noise-to-Signal Ratio, ensures the signal is large enough compared to the measurement noise





Potentiostats / Galvanostats

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Battery Test Stations & Cyclers

A full range of battery testers	24
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SP-200

Transportable potentiostat/galvanostat

SP-200 is a **500 mA** research grade, value-oriented potentiostat/galvanostat. With the **80 fA** accuracy ultra low current option, it is the ideal instrument for applications in electrochemistry particularly corrosion. The SP-200 offers a floating mode, analog filtering and a built-in calibration board.

Additionally, the SP-200 can be purchased with a standard DC potentiostat or an EIS capable one. There is also an Ultra Low Current (ULC) option. On-site experiments can be performed thanks to its portable design.

Applications

- General electrochemistry
- Sensors
- Corrosion
- Coatings
- Materials
- Batteries

Options

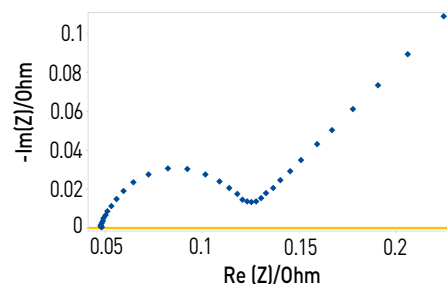
- Ultra Low Current: full scale range down to 1 pA
- Built-in EIS analyzer: up to 7 MHz
- Analog Ramp Generator: 1 MV/s, acquisition 1 μ s
- HCV-3048
- Suitcase



SP-240

Powerful in a compact chassis

SP-240 is a **4 A** transportable potentiostat/galvanostat/EIS. Its integrated booster makes it the perfect instrument for any application in electrochemistry especially energy device testing.





SP-300

Fast, sensitive, stable and modular

SP-300 is a **500 mA to 10 A** state-of-the-art research grade potentiostat/galvanostat/EIS with remarkable specifications such as 7 MHz max EIS frequency, floating mode, analog filtering, built-in calibration board, and stability bandwidths.

The SP-300's modular chassis accepts an optional high current/high voltage option board.

Alternatively, the SP-300 can accept a second potentiostat board (either standard or EIS) and perform as a Bipotentiostat. It is also a multiple user system as each channel board can be used independently by two different researchers.

Options

- Ultra Low Current: full scale range down to 1 pA
- Built-in EIS analyzer: up to 7 MHz
- Internal boosters:
 - $\pm 1 \text{ A}/\pm 48 \text{ V}$, $\pm 2 \text{ A}/\pm 30 \text{ V}$,
 - $\pm 4 \text{ A}/[-3;14] \text{ V}$, $\pm 10 \text{ A}/[-1;6] \text{ V}$
- HCV-3048
- Bi-potentiostat
- Analog Ramp Generator: 1 MV/s, acquisition 1 μs
- SP-300 suitcase



Bi-Pot

BP-300

The ultimate versatile bipot

The BP-300 is a **Bipotentiostat/Bigalvanostat** equipped with EIS capability and analog ramp generator. With the specific EC-Lab product control mode ie the CE to Ground mode, the BP-300 can address any bipot measurement. This measurement is typically required for Rotating Ring Disk Electrode (**RRDE**) and InterDigitated Array (**IDA**) electrodes.

The BP-300 can also be used as **multichannel** with two measuring channels that can be controlled by one or several computer(s).

Options

- Ultra Low Current: full scale range down to 1 pA
- Built-in EIS analyzer: up to 7 MHz
- Internal boosters:
 - $\pm 1 \text{ A}/\pm 48 \text{ V}$, $\pm 2 \text{ A}/\pm 30 \text{ V}$,
 - $\pm 4 \text{ A}/[-3;14] \text{ V}$, $\pm 10 \text{ A}/[-1;6] \text{ V}$
- HCV-3048

Applications

- General electrochemistry (RRDE measurement)
- Sensors
- Corrosion
- Electrolysis/anodizing
- Coatings
- Energy



VSP-300

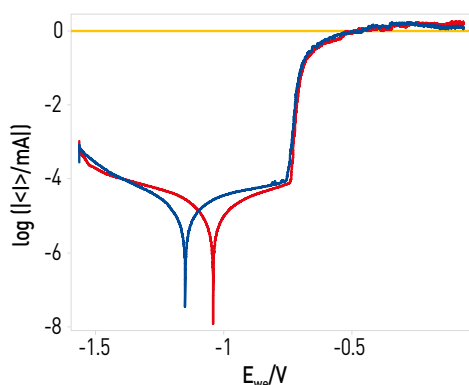
Small footprint multipotentiostat

The VSP-300 multichannel potentiostat/galvanostat/EIS is a versatile instrument offering **6 slots**.

Each channel board can accommodate an Ultra Low Current cable and can be associated with one or several booster kits. Up to 4 booster boards can be plugged in parallel in one VSP-300 chassis.

Applications

- Batteries/supercapacitors
- Fuel/photovoltaic cells
- General electrochemistry
- Corrosion
- Sensors
- Materials
- Energy storage



VMP-300

Ultimate multichannel potentiostat

The VMP-300 is the most modular chassis of the range, offering **16 slots** for potentiostats/galvanostats/EIS boards and/or booster boards.

They can be combined according to the user needs either to reach high currents, or to drive many measurements at the same time on all channels.

EIS measurements can be added as an option. The built-in EIS has a wide frequency range up to 7 MHz.

Low current sensitivity can be improved using the Ultra Low Current option.

All multichannel potentiostat are multiple user systems. Thanks to the Ethernet LAN connection capability, several computers can be connected to the unit at the same time.

Options

- Ultra Low Current: full scale range down to 1 pA (resolution of 80 aA)
- EIS measurement: up to 7 MHz
- Analog Ramp Generator: 1 MV/s, acquisition 1 μ s
- Internal boosters:
 - ± 1 A/ ± 48 V
 - ± 2 A/ ± 30 V
 - ± 4 A/ $[-3;14]$ V
 - ± 10 A/ $[-1;6]$ V
- HCV-3048
- Additional potentiostat/galvanostat/EIS



HCV-3048

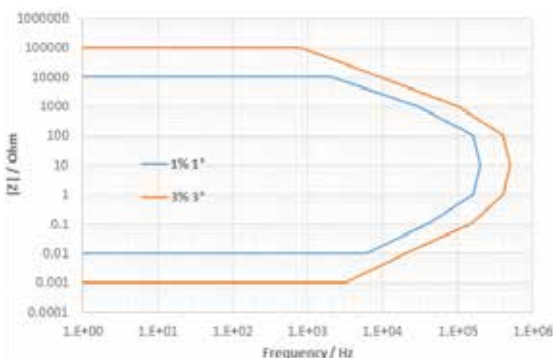
The unmatched combination of power and speed

The HCV-3048 is designed for battery stack/pack characterizations. The continuous maximum current of ± 30 A for a single unit can be extended up to ± 120 A by connecting four units in parallel. The control voltage range is **0-48 V**.

Impedance spectroscopy (EIS) provides valuable information on energy storage and conversion products, helping to identify the kinetic properties of multiple processes within the device under test. The HCV-3048 brings unmatched insight to high power systems.

Features

- Max current ± 30 A
- Voltage range 0-48 V
- EIS up to 500 kHz
- Stackable ± 120 A



Internal boosters

High current and high voltage boosters

A range of internal boosters has been designed to increase the current and the voltage specifications of the **SP-300, VSP-300, VMP-300 and BP-300**. Four models are available: ± 1 A/ ± 48 V, ± 2 A/ ± 30 V, ± 4 A/ $[-3;14]$ V, ± 10 A/ $[-1;6]$ V.

Depending on the instrument chassis, several similar boosters can be connected in parallel to expand the maximum current of the system, up to 150 A.

Configurations

- ± 1 A/ ± 48 V
- ± 2 A/ ± 30 V
- ± 4 A/ $[-3;14]$ V
- ± 10 A/ $[0;5]$ V

Features

- Booster range included in the autoranging
- EIS capability up to 2 MHz
- Plug-in modules
- Plug-and-play
- 5-lead connection type
- Parallel boosters to increase the max current



SP-50

Affordable and easy-to-use

The SP-50 is an economical, value oriented potentiostat/galvanostat designed to address applications in general electrochemistry.

Contained in a simple and compact chassis, the SP-50 is a fixed configuration unit with no options. It is an ideal instrument for teaching and education.

Applications

- Education/training
- General electrochemistry



SP-150

Research grade workstation

The SP-150 is a full featured economical research grade potentiostat/galvanostat. With its modular chassis, this instrument can be customized to address all applications in the area of classical electrochemistry.

The SP-150 potentiostat configuration can be selected at purchase to include an EIS-capable potentiostat board, and a low current option (1 nA full scale range).

It can also be connected to external high current boosters (2, 5, 10, 20, 80 and 100 A) or the FlexP series (see page 14).

Applications

- General electrochemistry
- Sensors
- Corrosion
- Energy sources
- Coatings

Options

- Low current: full scale range down to 1 nA
- Built-in EIS analyzer: up to 1 MHz
- External current boosters: Up to 800 A
- RDE control kit



VSP

Affordable research grade multichannels

The VSP is a research grade potentiostat system in a **5-channel** modular chassis.

Options provide EIS capability, low current, 4 A current booster and additional potentiostat channels.

The internal 4 A option takes two slots in the VSP chassis and requires a potentiostat board to be used with it. External boosters from 2 A up to 100 A can be used with each channel in the VSP.

Applications

- Electroanalytical
- General electrochemistry
- Corrosion
- Sensors
- Energy sources
- Energy storage
- Batteries
- Coatings

Options

- Low current: full scale range down to 1 nA
- Built-in EIS analyzer: up to 1 MHz
- External current boosters: Up to 800 A
- Internal ± 4 A booster kit for VSP only
- SAM 50 for stack (50 V) measurement (up to 30 elements with three SAM-50) for VMP3 only
- Additional potentiostat/galvanostat/EIS



VMP3

16-channel research grade workstation

The VMP3 is a research-grade multi-channel potentiostat. With its modular chassis design, up to **16 independent potentiostat channels** can be installed. The VMP3 can be equipped with additional capabilities, including low current measurement, and impedance.

Each potentiostat installed in the VMP3 can be connected to an external high current booster channel.

All multichannel potentiostats are multiple user systems. Thanks to the Ethernet LAN connection capability, several computers can be connected to the unit at the same time.



Features

- Voltage up to 60 V
- Current up to 200 A
- Parallel ability (x4)
- 10 kHz - 1 mHz EIS capable
- 3 kW continuous with water cooling
- 1.5 kW continuous with air cooling
- Cell temperature measurement included

FlexP external booster

Power EIS with FlexP

EIS provides valuable information about working electrical devices. It helps identify the kinetic properties of multiple processes within the device under test.

Power EIS brings unmatched insight to very high-power units that have been out of reach until now. Driven by SP-150, VSP or VMP3 potentiostat/galvanostat, the FlexP brings the best of electrochemistry knowledge and methods into the high power field.

Configurations

- 60 V / 50 A with the FlexP 0160 to address battery pack characterization
- 12 V / 200 A with the FlexP 0012 to address the electrolyzer and fuel characterization

Internal & external Boosters

Deliver more power to your application



SP-150, VSP and **VMP3** potentiostats can be interfaced to a separate current booster unit. These modular booster units can be filled with different booster boards (2, 5, 10, or 20 A). The standard booster chassis offers 8 available booster slots, each of them connected to a potentiostat board.

For higher current, 80 and 100 A booster units are available. They also exist as stand alone systems (HCP-803, HCP-1005 see page 15).

Configurations

- External:
 - ±2 A, ±5 A, ±10 A, ±20 A on ±10 V adjustable from -20 to +20 V
 - ±80 A on ±3 V
 - ±100 A on (0.6 - 5) V
- Internal kit (only for VSP): ±4 A ±10 V adjustable from -20 to +20 V

HCP-803

High current potentiostat for supercapacitors and fuel cells



The HCP-803 is a High Current Potentiostat capable of handling ± 80 A with a voltage range of ± 3 V. It is primarily designed for applications in the fuel cell and supercapacitor areas.

It is a combination of a research quality potentiostat and an 80 A booster built into the same chassis. The potentiostat has the same specifications as the VMP3 potentiostat boards (with EIS option) when not connected to the booster portion of the unit.

Applications

- Fuel cells
- Photovoltaic systems
- Supercapacitors
- Electroplating
- Battery

HCP-1005

More power for battery testing



The HCP-1005 is a compact High Current Potentiostat specially designed to study secondary batteries with a high capacity. With a voltage range of **0.6 to 5 V** and a current range of ± 100 A, this unit can be used to test Li-ion high current cells. The EIS capability integrated in the chassis is ideal for ageing tests.

The HCP-1005 structure is similar to the HCP-803. It is a combination of a research potentiostat and a 100 A booster built into the same chassis.

Applications

- Lithium-ion
- Nickel-Cadmium
- Nickel-Metal hydride
- Battery

Features

- Booster range included in the autoranging (for boosters up to 20 A)
- EIS capability
- Plug-in module or external chassis
- Plug-and-play
- 5-lead connection type

EC-Lab®

Powerful and intuitive advanced software

EC-Lab® is an advanced software package to perform electrochemistry measurements.

With more than **20 years** of development and constant improvement in techniques and features, EC-Lab® software has become the **benchmark** in potentiostat control software.

Display mode

Most of the experimental parameters can be **modified “on the fly”** during the experiment, with the changes stored into the raw data file.

The software interface is **adjustable** to create the best working environment for the user.

EC-Lab®'s graphics package provided with the software includes a powerful 3D plot feature and a tool to create **unique graph templates**.

Using our advanced “Process” function, the user can create new variables for each axis. This enables mathematical functions to be performed on data plotted **on any axis** (x, y1 and y2).

Experiment sequence builder

EC-Lab® software contains more than **80 techniques**. These techniques can address applications in voltammetry, EIS, corrosion and energy source/storage development.

A **powerful technique builder** can execute a series of different modular techniques as well as wait and loop tasks to create complex experimental sequences.

Moreover, within each technique, the user can create **up to 100 linkable sequences** of that experiment with different parameters. An email can be sent to the user, if desired, to be informed when a certain step of the experiment has been reached. Battery cycling can be synchronized with a **temperature control unit**.

EIS measurements

EIS measurements can be made in both controlled potential and controlled current modes from 10 μ Hz to 7 MHz.

The patented **“drift correction”** algorithm and multiple stability parameters allow users to acquire high quality data from their EIS measurements.

Impedance spectroscopy

General electrochemistry

Electro-analytical

Corrosion

Battery

Super-capacitor

Fuel cell

Photovoltaic cell

EC-Lab® provided with...

Single potentiostats/galvanostats:

SP-50, SP-150, SP-200, SP-240, SP-300

Bipot:

BP-300

Multi potentiostats/galvanostats:

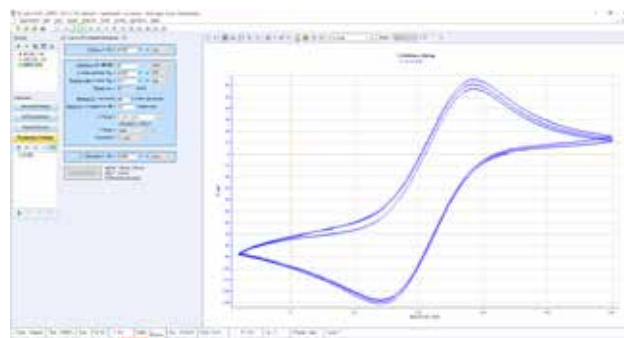
VMP-300, VSP, VMP3, VSP-300

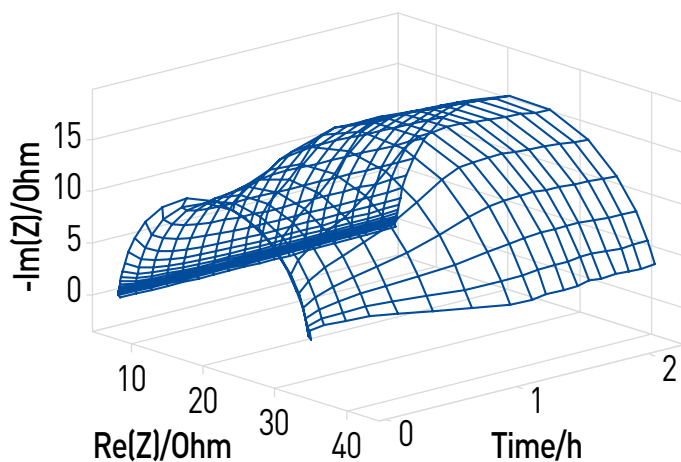
High current potentiostats/galvanostats:

HCP-803, HCP-1005

Battery test stations:

MPG2, MPG-205





EC-Lab® Analysis package

An extended range of analyses

Display

Powerful electro-analytical analysis tools (such as peak find/height, convection wave, integral, Tafel fit, R_p determination) are available in EC-Lab®. These analyses incorporate classical fit routines (linear, polynomial, multi-exponential) and algorithms. All the analysis results are stored in a separate file.

Fitting

EC-Lab®'s EIS modeling package, Z Fit, utilizes the equivalent circuit approach. There are over 150 standard circuits and two minimization algorithms available to help understand impedance plot information.

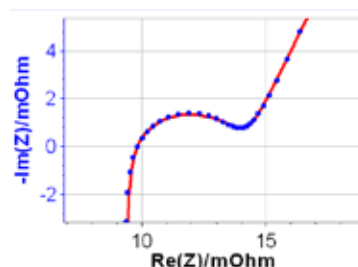
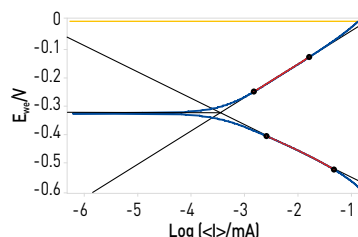
The user can define and build his own circuit model using a range of thirteen simple elements (R , C , L , Q , W , G , W_δ , M , G_α , G_β , L_α , M_α , M_ν). The last elements can be assimilated to transmission lines.

A batch processing feature allows the fitting of multiple cycles in an impedance experiment. Cable effects can be compensated by using cable compensation tool.

Simulation

Several tools are available to simulate CV curve, Tafel plot or EIS data. They can be used as training tools.

CV Sim allows the user to create data with different mechanisms such as single (E) or multi (up to EEEEE) electron transfer. Electron transfer reactions can also be mixed with chemical reactions to simulate an EC mechanism.



General electrochemistry

- Peak Analysis...
- Wave Analysis...
- CV Fit...
- Levich...
- Koutecky-Levich...

Corrosion

- R_p Fit...
- Tafel Fit...
- Electrochemical Noise...
- Corr Sim...
- VASP Fit...
- CASP Fit...

EIS

- Z Fit...
- Z Sim...
- Mott-Schottky...
- Compensation...
- Kramers-Kronig...

Battery process

- Process data (capacity, efficiency, energy...)

Photovoltaic

- Photovoltaic analysis (fill factor, efficiency...)

Math

- Polynomial Fit...
- Multi-Exponential Fit...
- Line Fit...
- Subtract Files...
- Integral...
- Min Max...
- Filter...
- Fourier Transform...
- Linear Interpolation...



PG-581

On-site measurement

When you need to make those on-site trials or routine field measurements, the PG-581 goes with you.

The compact design provides a user configurable instrument for demanding research applications and in-field use via its internal rechargeable battery.

Applications

- Education/training
- General electrochemistry
- Corrosion
- Sensors
- Electroanalytical

Options

- Floating
- ± 8 V scan voltage
- 5-working electrode multiplexer
- Computer-programmable experiment



SensorStat

Dedicated to sensor applications

The modular design of the SensorStat potentiostat provides a user configurable system (8 to 14 channels) for demanding research applications.

By connecting several SensorStat units together, an extended system is created. A 98-electrode sensor can be individually addressed by chaining together seven 14-channel systems.

Applications

- Electroanalysis studies
- Dual electrode voltammetry
- Ring-disk electrode studies
- Electrochemical sensors
- Biomedical
- Electroanalytical
- Corrosion

Options

- RC10 V rotator controller
- ± 8 V scan range
- Floating
- ± 8 V compliance



UiEChem™/UiECorr™

Autosequencing

The UiEChem™/UiECorr™ software provides a **flexible, intuitive** interface for running multiple experiments in a user-defined sequence. Once the sequence has started the experiments run **automatically**, one-at-a-time, in the order in which they appear in the sequence.

Graphic display & analysis

A standard graphic display is provided for each technique. Users can also define their preferred format for each technique from a simple template. The UiEChem™ software features an **easy-to-use** peak analysis routine.

Advanced waveform generation

The instruments are capable of generating complex and repetitive waveforms with precision timing. The instrument has a sequenced waveform generator which generates waveforms based on a sequence of steps. Each step may comprise a waveform which includes pulses, linear sweeps and arbitrary waves.

Provided with...

PG-581

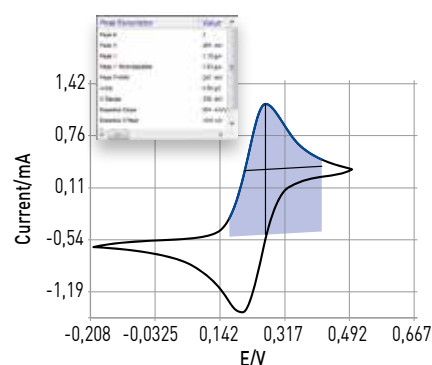
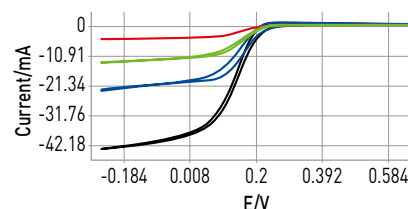
SensorStat

UiEChem™:

- Cyclic Voltammetry,
- Linear Sweep Voltammetry,
- ChronoAmperometry,
- ChronoPotentiometry,
- ChronoOCV,
- Chrono auxiliary potential,
- Square Wave Voltammetry,
- Normal Pulse Voltammetry,
- Differential Pulse Voltammetry

UiECorr™:

- Ecorr vs Time,
- Linear Polarization Resistance,
- Tafel Plot,
- Potentiostatic Polarization,
- Galvanostatic Polarization,
- Potentiodynamic Polarization,
- Zero Resistance Ammetry



Channel Specifications

	Premium	Essential	Dedicated
EIS capability	10 µHz to 7 MHz	10 µHz to 1 MHz	n.a.
Linear Scan Generator	yes (1 MV/s), sampling rate 1 µs	n.a.	n.a.
Floating option	yes	CE to Ground	yes
Filters	analog/numeric	numeric	n.a.
Acquisition time	12 µs (1 µs with ARG option)	20 µs	10 µs
Electrodes connections	2, 3, 4, 5	2, 3, 4, 5	2, 3
IR compensation	manual, EIS, current interrupt (software and hardware)	manual, EIS, current interrupt (software)	n.a.
Current			
Maximum current	±500 mA	±400 mA ±800 mA for SP	±20 mA
Current ranges	with standard board: 9: 10 nA to 1 A with low current option: 13: 1 pA to 1 A	6: 10 µA to 1 A 9: 1 nA to 100 mA (SP-50: n.a.)	8: 1 nA to 10 mA -
Lowest accuracy	with standard board: ±100 pA on 10 nA range with low current option: ±100 fA on 1 pA range	±20 nA on 10 µA range ±2 pA on 1 nA range	±10 pA on 1 nA range -
Lowest resolution	with standard board: 0.8 pA on 10 nA range with low current option: 80 aA on 1 pA range	0.8 nA on 10 µA range 80 fA on 1 nA range	61 fA -
Current booster	internal: 1 A, 2 A, 4 A, 10 A, 150 A external: n.a.	4 A for VSP only 2, 5, 10, 20, 80, 100 A, 2 kW load box	n.a. n.a.
Input impedance	1 TΩ (//10 pF), ULC: 100 TΩ (//6 pF)	1 TΩ (//20 pF)	0.1 TΩ (//5 pF)
Voltage			
Compliance	±12 V	±10 V	±8 V
Max applied potential	±10 V (±48 V with 1 A/48 V booster)	0-20 V adjustable	±2 V (±8 V in option)
Resolution	1 µV on 60 mV	5 µV on 200 mV	61 µV on ±2 V
Accuracy	< ±1 mV	< 5 mV on ±2.5 V	< 5 mV on ±2 V
Range	±2.5 V, ±5 V, ±10 V, ±25 mV, ±250 mV	±2.5 V, ±5 V, ±10 V	±2 V
Maximum scan rate	200 V/s (1 MV/s with ARG option)	200 V/s	10 V/s
Control amplifier			
Potentiostat bandwidth	8 MHz	1 MHz	1.6 MHz
Potentiostat rise/fall time	< 500 ns	< 2 µs	1 V/µs into 1 kΩ
General			
I/O (analog/TTL)	3/2	3/2	n.a./n.a.
Interfaces	Ethernet, USB 2.0	Ethernet, USB 2.0	USB 2.0

n.a.: not available

Chassis Specifications

Premium	SP-200	SP-240	SP-300	BP-300	VSP-300	VMP-300
Slot available	1	1	2	2	6	16
Dimension	167 x 410 x 225 mm	205 x 410 x 225 mm	205 x 410 x 225 mm	254 x 5147 x 337 mm	254 x 517 x 337 mm	534 x 565 x 315 mm
Weight	6 kg	7.5 kg	7.5 kg	20 kg	20 kg	30 kg
Power Requirement	350 W	350 W	350 W	650 W	650 W	1500 W

Essential	SP-50	SP-150	VSP	VMP3
Slot available	1	1	5	16
Dimension	136 x 377 x 197 mm	136 x 377 x 197 mm	435 x 335 x 94 mm	495 x 465 x 260 mm
Weight	4 kg	4.5 kg	8 kg	20 kg
Power Requirement	110 W	110 W	300 W	650 W

Dedicated	PG-581	Sensorsat
Slot available	1	14
Dimension	84 x 180 x 52.5 mm	450 x 320 x 135 mm
Weight	0.3 kg	14 kg
Power Requirement	15 W	130 W

Applications

	Premium					Essential				Dedicated	
	Std	EIS	ULC*	Booster ⁽¹⁾	ARG**	Std	EIS	LC***	Booster ⁽²⁾	Std	
Education	■	■				■	■			■	
General electrochemistry	■	■	■			■	■	■		■	
Electroanalytical	■	■	■			■	■	■		■	
Electro-catalysis	■	■	■	■	■	■	■	■	■		
Nanotechnology/sensors	■	■	■	■	■	■	■	■		■	
Battery	■	■		■		■	■		■		
Supercapacitor	■	■		■	■	■	■		■		
Fuel cells	■	■		■	■	■	■		■		
Solar cells	■	■		■		■	■		■		
Electrolysis				■					■		
Pack of cells	■	■		■		■	■		■		
Corrosion	■	■	■			■	■	■		■	
Coatings	■	■	■	■	■	■	■	■			
Materials	■	■	■	■		■	■	■			

For each instrument, modules can be mixed together

■ suitable ■ recommended ■ excellent
 * ULC: Ultra Low Current ** ARG: Analog Ramp Generator ***LC: Low Current
 (1): more details on page 11
 (2): more details on pages 14 - 15

Premium boosters

Specifications

	±1 A/±48 V	±2 A/±30 V	±4 A/[-3;14] V	±10 A/[-1;6] V	±30 A/[0;48] V
Current					
Compliance	±1 A	±2 A	±4 A	±10 A	±30 A (±120 A with 4 units)
Accuracy	< 2 mA on 1 A range	< 4 mA on 2 A range	< 8 mA on 4 A range	< 60 mA on 10 A range	< 240 mA on 30 A range
Voltage					
Compliance	±49 V	±30 V	-3 V ; +14 V	-1 ; +6 V	0 ; +48 V
Control	±48 V	±30 V	-3 V ; +10 V	-1 ; +6 V	0 ; +48 V
Features					
EIS frequencies	2 MHz - 10 µHz	1 MHz - 10 µHz	1 MHz - 10 µHz	1 MHz - 10 µHz	500 kHz - 10 µHz
Bandwidth (-3 dB)	> 2 MHz	> 3 MHz	> 4 MHz	> 8 MHz	800 kHz
Slew rate (no load)	> 15 V/µs	50 V/µs	50 V/µs	50 V/µs	> 20 V/µs
Rise/fall time (no load)	< 250 ns	< 200 ns	< 200 ns	< 200 ns	< 3 µs
Floating mode	yes	yes	yes	yes	yes
Parallel ability	no (Yes with new version)	yes	yes	yes	yes up to 4
Connection	2, 3, 4, 5 leads	2, 3, 4, 5 leads	2, 3, 4, 5 leads	2, 3, 4, 5 leads	2, 3, 4 leads

Essential boosters

Specifications

	2/4/5 A	10/20 A	80 A/HCP-803	100 A/HCP-1005
Current				
Compliance	2 A: ± 2 A, 4 A: ± 4 A, 5 A: ± 5 A	10 A: ± 10 A, 20 A: ± 20 A	± 80 A	± 100 A
Accuracy	2 A: < 4 mA on 2 A range, 4 A: < 8 mA on 4 A range, 5 A: < 10 mA on 5 A range	10 A: < 20 mA on 10 A range, 20 A: < 40 mA on 20 A range	< 160 mA on 80 A range,	< 200 mA on 100 A range
Voltage				
Compliance	adjustable ± 10 V range	adjustable ± 10 V range	± 3 V	0.6 - 5 V
Control	± 20 V	± 20 V	$\pm 3/5$ V	$\pm 3/5$ V
Features				
EIS frequencies	2 A: up to 150 kHz, 4 A: up to 130 kHz, 5 A: up to 120 kHz	10 A: up to 80 kHz, 20 A: up to 80 kHz	up to 15 kHz,	up to 10 kHz
Bandwidth (-3dB)	1 MHz	1 MHz	1 MHz	1 MHz
Rise time and fall time (no load)	15 μ s	25 to 60 μ s	95 μ s to 1.7 ms	95 μ s to 1.7 ms
Parallel ability	no	no	no	no
Connection	2, 3, 4, 5 terminal leads	2, 3, 4, 5 terminal leads	2, 3, 4, 5 terminal leads	2, 3, 4, 5 terminal leads
General				
1 external input	security to open circuit (TTL level)	security to open circuit (TTL level)	security to open circuit (TTL level) Emergency push button	Security to open circuit (TTL level) Emergency push button

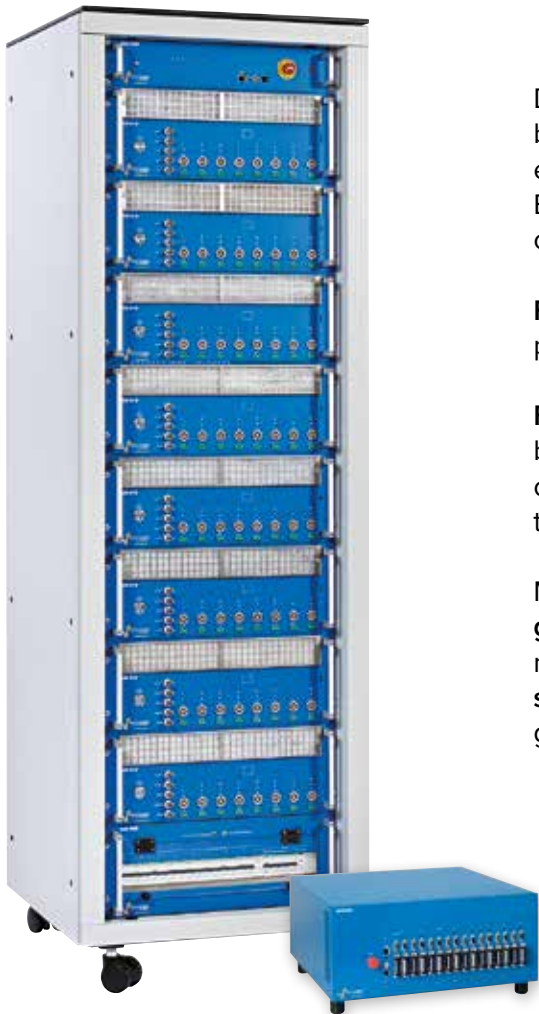
FlexP 0160

FlexP 0012

Current	
Compliance	50 A up to 200 A (4 in parallel)
Accuracy	0.2% of value $\pm 0.1\%$ FSR
Voltage	
Compliance	± 50 A: 2 - 58 V (water cooled)
Control	[1; 60] V
Features	
EIS frequencies	10 kHz
Bandwidth (-3dB)	-
Rise time and fall time (no load)	< 10 μ s
Parallel ability	yes up to 4
Connection	2, 3, 4 terminal leads
General	
1 external input	embedded (cell temperature and emergency)

Compliance	200 A up to 800 A (4 in parallel)
Accuracy	0.4% of value $\pm 0.5\%$ FSR
Voltage	
Compliance	± 200 A -1;+10 V (water cooled)
Control	[-2,5;+11,5] V
Features	
EIS frequencies	10 kHz
Bandwidth (-3dB)	-
Rise time and fall time (no load)	< 20 μ s
Parallel ability	yes up to 4
Connection	2, 3, 4 terminal leads
General	
1 external input	embedded (cell temperature and emergency)

A full range of battery testers



Depending on your application, your requirements for battery/supercapacitor testing can be different (reference electrode required or not, sampling, maximum frequency for EIS, number of channels, etc.). Bio-Logic offers a wide range of testing solutions to match your needs.

For advanced research measurements, Bio-Logic potentiostats/galvanostats are the right choice.

For classical battery cycling, BCS-8xx series will offer you best-in-class performance, research EIS measurements as an option and up to 128 channels in a single cabinet, making it the ideal solution for **high-throughput measurements**.

MPG-2xx series is a solution in-between. It offers **research grade** battery testing and can be provided in a rack, with a maximum of 80 channels to **perform many tests simultaneously**. Each channel is an independent potentiostat/galvanostat.

How to choose your battery tester?

	VMP3/VMP-300	MPG-2xx series	BCS-8xx series
Application	High end research	Research development	High-throughput battery/ material screening
Current ranges	1 pA - 150 A	10 μ A - 5 A	10 μ A - 120 A
Voltage range	\pm 10 V	-2;9 V	0;9 V
EIS frequency range	7 MHz - 10 μ Hz	20 kHz - 10 μ Hz	10 kHz - 10 mHz
Built-in EIS	Yes on each channel	Yes on each channel	Yes on each module
Acquisition time	200 μ s/1 μ s with ARG option	200 μ s	2 ms
Electrode connection	2,3-electrode/4-points measurement with CE measurement	2-electrode/4-points measurement 3-electrode/5-points on MPG-2	2-electrode/4-points measurement
HPC measurement	Yes. Down to 6 ppm	Yes. Down to 6 ppm	Yes. Down to 6 ppm
Channels / module	16	16	8
Max Channels / cabinet	-	80	128



MPG-2xx series

R&D grade battery test stations

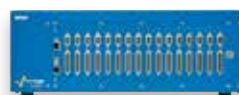
The MPG-2xx series is offered in two fixed configurations with or without EIS on every channel:

- MPG-2: 16 channels/100 mA each
- MPG-205: 8 channels/5 A each

The MPG-2xx series can be provided in a rack capable of supporting up to 5 units.

Only one computer is necessary to control all the units thanks to the Ethernet connection. With this connection, the MPG-2xx series can be installed on a Local Area Network to allow multiple users to access the instruments and follow the battery cycling from anywhere.

The MPG-2xx series offers temperature measurement and three optional connection modes to the battery (battery holder, short or long cables). Each channel has two analog inputs and one analog output to allow interfacing with external instruments.



MPG-2

- 16 channels
- 100 mA
- 3 electrodes/5 points



MPG-205

- 8 channels
- 5 A
- 2 electrodes/4 points

Options

- EIS
- Rack (5 units)
- Short (25 cm) or long cables (2.5 m)
- Temperature probe
- BH-1i, CCH-8 and CCH Battery Holder
- 5 A booster for MPG 2

Specifications

- Current ranging: 10 μ A up to max current with a resolution 0.004% of the range
- Resolution of 300 μ V programmable down to 5 μ V by adjusting the dynamic range (100 μ V resolution on 5 V range)
- Acquisition time: 200 μ s
- No limit in time and data recording

Software

Like Bio-Logic potentiostats / galvanostats, the MPG-2xx series is supplied with **EC-Lab® software**. It provides techniques specifically designed for batteries and general electrochemistry applications, such as cyclic voltammetry. An extended range of analyses are also available (capacity, efficiency, energy, etc.). Note that EC-Lab® allows control of several VMP3 or MPG-2xx instruments from one session.

BCS-8xx series

Battery cycling test stations

Each BCS-8xx module is composed of 8 channels. To ensure better accuracy in current control and measurement, **5 current ranges** are available depending on the model.

Channels of BCS-815 modules can be connected in parallel to increase the maximum current up to **120 A**.

With an 18-bit analog to digital converter for the voltage measurement, the resolution of the BCS-8xx is an impressive **40 μ V**.

EIS-capable modules provide EIS over a frequency range from **10 kHz to 10 mHz** for accurate and fast determination of the battery internal resistance on every channel.

BCS-8xx modules can be added to a single cabinet. Several sizes are offered (38U, 24U, 12U and 6U).

Specifications

- Optional high quality EIS: Full scan from 10 kHz to 10 mHz
- 18-bit A/D converter (40 μ V resolution)
- HPC measurement down to 6 ppm
- Modularity from few μ A to 120 A
- Voltage measurement from 0 V to 10 V
- Module mixing (BCS-805/810/815)
- Powerful interface
- 2 ms acquisition time
- Several cabinet sizes
- Plug and play module installation

Options

Connection:

- Cell cable from 25 cm to 10 m
- CCH-1xx Coin cell holder
- BH-1i Cylindrical battery holder
- CC8 Current collector to set parallel mode (up to ± 120 A).
- CCH-8 8 positions coin cell holder

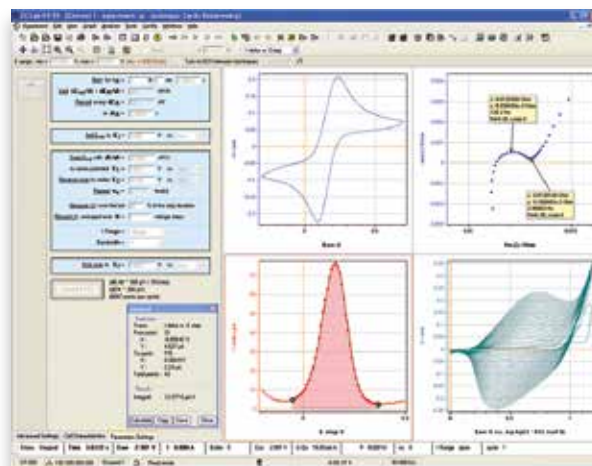
Cabinet:

- Rolling cabinet (38U, 24U)
- Benchtop cabinet (12U, 6U)



BT-Lab® provided with...

BCS-805, BCS-810, BCS-815



BT-Lab®

An interface designed for battery testing

The BT-Lab® software offers great usability and flexibility for battery cycling. The powerful «ModuloBat» sequence builder offers **12 control modes** for **easy programming** of unique sequences, while the interface is informative and simple, simultaneously showing the experiment parameters and the corresponding graph of each selected channel.

Global view

All channels can be viewed **simultaneously** on an advanced global view. The status of each channel is displayed with different colors to give quick, informative, and visual indicators. The time, current, voltage and charge values can be all displayed simultaneously.

Comprehensive graphic and analysis package

The BT-Lab® graphic package is embedded in the software and includes powerful tools to create **graph templates** and analyze data. This package offers a unique trace filtering option by channel. This results in a multigraph window capable of displaying **up to 128 graphs** within a single window. With the advanced graph properties, the user can add and customize new variables for each axis. Powerful analysis tools (dQ/dV, HPC...) are also available in BT-Lab®.

EIS capability

The BT-Lab® software includes the capability for electrochemical impedance spectroscopy (EIS) measurement **on every channel** of EIS-capable modules, in a frequency range of 10 kHz to 10 mHz both in potentiostatic and galvanostatic modes. A **drift correction** option is available to correct the voltage drift of the battery during the EIS measurement.

ModuloBat

- **12 control modes:**
 - Constant Current/Voltage/Power/Resistance
 - Voltage/Current Scan
 - Galvano/Potential EIS
 - Current Interrupt
 - Rest/Loop
 - Urban Profile Import

- **Up to 100 sequences**
- **3 limits per sequence**
- **3 recording conditions per sequence**
- **Modify on the fly**

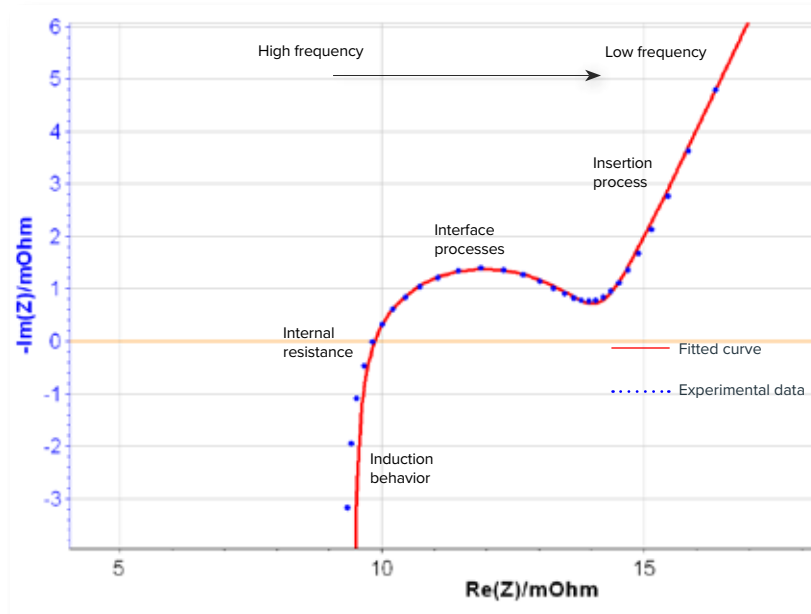
Why impedance measurement for battery testing ?

BCS-8xx series, with its fast bandwidth controllers, offers both **potentio-** and **galvano-** control for EIS measurements in **10 kHz to 10 mHz** frequency range, with user-specified number of data points and frequency range to be recorded. User is also in control of the excitation amplitude. Impedance spectroscopy can be used as a standalone technique, but it can also be seamlessly incorporated into the ModuloBat technique to record the impedance spectrum of the battery, either in equilibrium or steady-state conditions. That means you not only can record a spectrum of the cell at a constant voltage, but also under a given galvanostatic load.

If there are sources of **uncompensated inductance** or capacitance in the cell, only a full impedance spectrum can be a reliable measure of internal resistance through an automated spectrum fitting procedure.

Low frequency range of the spectrum is an invaluable source of information about Li⁺ diffusion within the electrolyte (separator), as well as porosity within electrodes and inside the active material particles.

18-bit resolution allows recording small-amplitude EIS on top of substantial DC currents with very good accuracy.



Specifications

	MPG-2	MPG-205
Channels / module	16	8
Cell connection	2, 3, 4 or 5 terminal leads	2 or 4 terminal leads
Cell control		
Compliance	±10 V @ 100 mA	-2 V; 9 V @ 5 A
Maximum current	±100 mA continuous	±5 A continuous
Maximum potentiel	10 V @ 100 mA	9 V @ 5 A
Potential resolution	200 µV down to 5 µV	
Current resolution	0.004% of FSR* /0.8 nA	
Current accuracy	±0.1% of control ±0.01% of FSR*	
Voltage measurement		
Ranges	±10 V, ±5 V, ±2.5 V	0 - 5 V, 0 - 10 V
Accuracy	±0.1% of control ±0.01% of FSR*	
Resolution	0.004% of FSR*	
Acquisition speed	200 µs	
Noise (peak to peak 0-100 kHz)	600 µV	
Curent measurement		
Ranges	±100 mA, ±10 mA, ±1 mA, ±100 µA, ±10 µA, autorange	±5 A, ±1 A, ±100 mA, ±10 mA, ±1 mA, ±100 µA, ±10 µA, autorange
Accuracy	±0.1% of control ±0.01% of FSR*	
EIS option		
Frequency range	20 kHz to 10 µHz	
Amplitude	1 mVpp to 1 Vpp, 0.1% to 50% of the current range	
Mode	Single Sine, Multi Sine, FFT analysis	
General		
Dimensions (W x D x H)	260 x 495 x 465 mm	254 x 494 x 454 mm
Power requirements	350 W, 85-264 V, 47-440 Hz	860 W, 85-264 Vac, 47-440 Hz
Weight	17 kg	25 kg

*FSR: Full Scale Range

	BCS-805	BCS-810	BCS-815
Channels / module	8	8	8
Voltage			
Range	0 V to 10 V	0 V to 10 V	0 V to 9 V
Resolution control measurement	150 µV 40 µV (18 bit)	150 µV 40 µV (18 bit)	150 µV 40 µV (18 bit)
Accuracy	<±0.3 mV ±0.01% of setting	<±0.3 mV ±0.01% of setting	<±0.3 mV ±0.01% of setting
Slew rate	150 kV/s	150 kV/s	3 kV/s
Current			
Max (continuous) per channel	±150 mA	±1.5 A	±15 A
Ranges	5: 100 mA down to 10 µA	5: 1 A down to 0.1 mA	5: 10 A down to 1 mA
Resolution control measurement	Down to 800 pA Down to 0.2 nA (18 bit)	Down to 8 nA Down to 2 nA (18 bit)	Down to 80 nA Down to 20 nA (18 bit)
Accuracy	< 0.05% of setting ±0.01% of FSR	< 0.05% of setting ±0.01% of FSR	< 0.5% of setting ±0.01% of FSR (10 A range) < 0.05% of setting ±0.01% of FSR (others)
Parallel ability	No	No	Yes Up to ± 120 A with 8 channels
EIS			
Built-in Range	On each module 10 kHz - 10 mHz	On each module 10 kHz - 10 mHz	On each module 10 kHz - 10 mHz
Measurement			
Thermocouple	n.a	K Type on each channel -25 °C +200 °C with accuracy of ±2 °C	K Type on each channel -25 °C +200 °C with accuracy of ±2 °C
Analog in	1 (18 bit) on each module	1 (18 bit) on each module	1 (18 bit) on each module
Analog out	1 (16 bit) on each module	1 (16 bit) on each module	1 (16 bit) on each module
Cell connection			
	4 terminal leads + Guard	4 terminal leads + Guard	4 terminal leads
General			
Height	1U	2U	4U
Weight	5 kg	10 kg	23 kg
Power consumption	60 W	220 W	1700 W

n.a.: not available



FC-Lab® Software

Powerful monitoring software

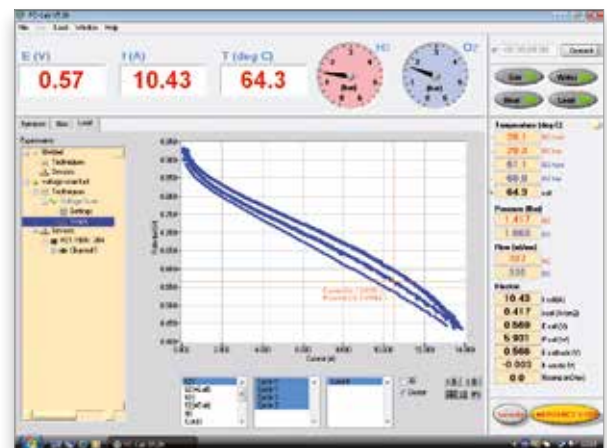
FC-Lab® is the operating software used to control and analyze data from the instrument. With an easy-to-use interface, it offers all controls and functions for fuel cell testing with individually tabbed menus.

The graphic functions offer a real-time display of performance of the fuel cell for each of the measured or controlled variables.

Data can be analyzed by EC-Lab® fitting tools (Z Fit...).

Applications

- PEM FC development and testing
- Single cell or small stacks



FCT series

Two models for 25 and 50 cm² PEM FC

The FCT-50S/Z and FCT-150S/Z are **compact** fuel cell test stations designed for PEM FC (Proton Exchange Membrane Fuel Cell) testing. Based on customers feedback, they have been designed to be the most flexible test stations on the market.

The compact chassis integrates a programmable electronic load (250 W), gas and water control circuitry (flow, pressure and temperature) and data acquisition.

The electronic load uses state-of-the-art technology and is capable of reaching **very low voltage** levels (virtually 0 V) at 150 A (for FCT-150S/Z) and 50 A (for FCT-50S/Z).

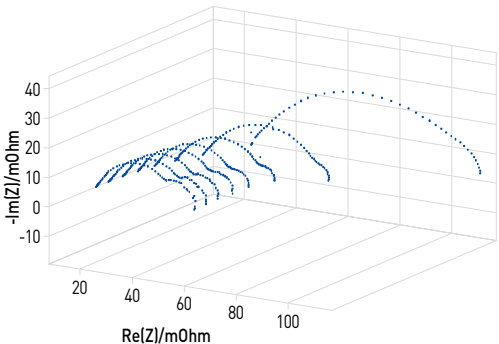
A number of safety features have been incorporated in the hardware and software. To conduct long-term experiments, such as fuel cell ageing, Bio-Logic has developed an automated humidifier, water filling and condenser water purging, all managed by FC-Lab[®] control software.

Specifications

	FCT-50S/Z	FCT-150S/Z
Max current	50 A	150 A
Max voltage	5 V	5 V
Electronic Load	250 W	250 W
Minimum load resistor	0.7 mΩ	0.7 mΩ
Built-in EIS analyzer	10 μHz up to 10 kHz	10 μHz up to 10 kHz
Current measurement accuracy	0.5% FSR	0.5% FSR
Current resolution	4 mA	11 mA
Potential resolution	76 μV	76 μV
Fuel gas flow control	0 - 40 L/h	0 - 120 L/h
Oxidant gas flow control	0 - 100 L/h	0 - 300 L/h
Back pressure control	0 - 5 bars	0 - 5 bars
5 temperature control	cell, humidifiers, heaters	cell, humidifiers, heaters
Interfaces	Ethernet	Ethernet
Safety Alarms with automatic N ₂ purge	under voltage, over current, over temperature, over water	under voltage, over current, over temperature, over water

Specifications

	FC-Lab
Gas control and display independent for each cell and each gas	temperatures, pressures, flows
Facilities	current density display, on the fly parameter changes, multivariable graphic display
Loal Control	galvanostatic/ galvanodynamic, potentiostatic/ potentiodynamic, power/load
Techniques	open circuit voltage, voltage pulses, current pulses, voltage scan, current scan, potentio EIS, galvano EIS, constant load discharge, constant power discharge, macrotechniques (SGEIS, SPEIS), loop
Analysis	EC-Lab [®]



Comprehensive solutions from impedance analyzer to temperature control units and sample holders



MTZ-35

35 MHz Impedance Analyzer

MTZ-35 is an impedance analyzer dedicated to material characterization over the frequency range of **10 μ Hz to 35 MHz**.

The **MTZ-35** can be coupled with the High Temperature Furnace **HTF-1100** and the Intermediate Temperature System **ITS** in order to investigate materials properties over a wide temperature range (**-40 °C to 1100 °C**).

Two sample holders are offered: **HTSH-1100** for high temperature use, in-plane and through-plane, **CESH** sample holders for intermediate temperature use (-40 °C to 150 °C).

Applications

- Ceramics
- Solid electrolytes
- Polymers
- Rubbers
- Dielectrics
- Composites
- Solar/photovoltaic cells
- Semiconductors
- Biological cells
- Liquids
- Electronic components

Specifications

Generator	
Frequency range	10 μ Hz to 35 MHz
Voltage range DC	$\pm 100 \mu$ V to ± 10 V
Voltage range AC	100 μ V to 10 V
Measurement ranges	
Inductance	10 nH to 10 kH
Capacitance	1 pF to 1000 μ F
Resistance	1 m Ω to 500 M Ω
Basic accuracy	0.1%

MT-Lab® Software

MT-Lab® is an intuitive software used to control the MTZ-35. It also monitors several temperature control units:

- High temperature furnace (HTF-1100)
- Intermediate Temperature System (ITS)
- Temperature control systems using Eurotherm 22xx and 35xx series controllers

Open circuit / Short circuit Compensation

MT-Lab® software is provided with a compensation protocol for the compensation of residual impedance due to cell cables and test fixtures.





ITS



HTF-1100



HTSH-1100



CESH on its base

Temperature Control Unit

	Operating Temp	Features
HTF-1100	RT to 1100 °C	Heating rate adjustable K-type thermocouple
In-plane ITS	-35 to 150 °C	Temperature accuracy: 0.3 °C PT1000 probes
Through-plane ITS	-35 to 150 °C	

Sample Holders

	Operating Temp.	Features	Compatibility
HTSH-1100 Φ=25 mm Φ=12 mm Φ=06 mm Φ=03 mm	RT to 1100 °C	Quartz tube for controlled atmosphere Leak-tight up to 2 bar relative K-type thermocouple	HTF-1100 Tubular furnaces
CESH In-plane Through-plane	-40 to 150 °C	Leak-tight up to 2 bar relative	ITS Other temperature units

Temperature control management

Five temperature control modes are available with MT-Lab®. The software offers a wide range of heating rates and two temperature stabilization modes (fast and precise) based on closed-loop temperature regulation. Temperature control is optimized. Setpoint temperatures are reachable and adjustable without overshoot.



A complete graphic package

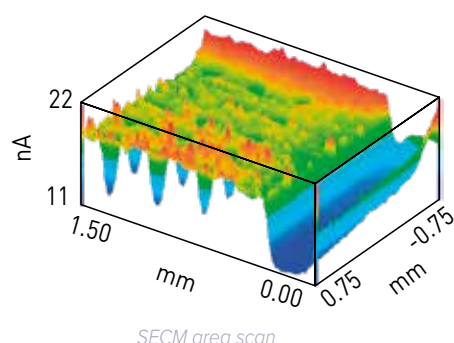
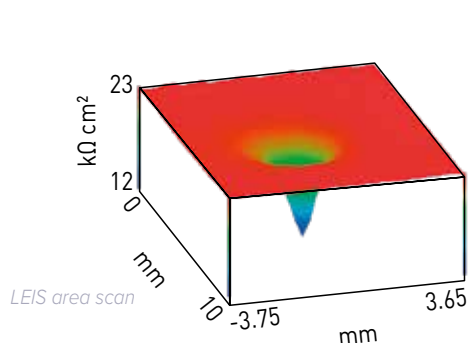
MT-Lab® is a very easy-to-use software. The settings and graphs are displayable on one screen view. The software includes numerous graphic tools and advanced tools for equivalent circuit modeling (Z Fit). Users can build their own circuit model using a range of 13 electrical elements (R, C, L, Q, La, W, Wd, M, Ma, Mg, G, Ga).

Systems for localized electrochemistry measurement

The traditional potentiostat/galvanostat measures an average response of the electrode material and is often considered homogeneous. However, for more detailed studies, it is interesting to look beyond this homogeneity to study the spatial dependence of the electrode properties.

Our localized electrochemistry platforms offer a range of modular and non-modular systems that can include up to 9 distinct localized measurement techniques.

The table below summarizes the techniques, the type of information that can be obtained, the smallest size of the features that can be detected and the typical applications.



Scanning techniques	Information	Resolution	Applications	
SECM	Scanning ElectroChemical Microscopy	reactivity, conductivity	probe size	bio electrochemistry, corrosion, fuel cells, batteries, catalysts
ac-SECM	alternating current Scanning ElectroChemical Microscopy	reactivity, conductivity, or localized EIS (no mediator required)	probe size	bio electrochemistry, corrosion, fuel cells, batteries, catalysts
ic-SECM	intermittent contact Scanning ElectroChemical Microscopy	topography and reactivity or conductivity or localized EIS.	probe size	bio electrochemistry, corrosion, fuel cells, batteries, catalysts
LEIS	Localised Electrochemical Impedance Spectroscopy	local impedance of the sample	hundreds of μm	corrosion, coatings, catalysts
SVP (SVET)	Scanning Vibrating Electrode Technique	electrochemical activity	tens of μm	corrosion, coatings, catalysts
SDS (SDC)	Scanning Droplet System (Cell)	dc electrochemistry in a droplet of electrolyte	hundreds of μm	corrosion, coatings
ac-SDS	alternating current Scanning Droplet System	impedance in a droplet of electrolyte	hundreds of μm	corrosion, coatings
SKP	Scanning Kelvin Probe	work function difference / topography	probe size	corrosion, coatings, semi-conductors, catalysts
OSP	Optical Surface Profiler	topography	100 nm (Z) 30 μm (X & Y)	any field, complimentary to the above

M470

Ultra high resolution scanning stage with multiple modular techniques

The M470 is the 4th generation of scanning probe systems, which includes a high-resolution scanning stage and the fullest complement of modular scanning probe techniques.

The M470 achieves the perfect balance of scan speed, resolution and accuracy to deliver a new standard in spatially resolved electrochemical measurements.

The fast precise closed loop positioning system is designed specifically for the demands of scanning probe electrochemistry with nanometer resolution.

9 available techniques

SECM*	LEIS*	ac-SDS*
ac-SECM*	SVET*	SKP
ic-SECM*	SDS*	OSP

* Additional: Electrochemistry, Corrosion and EIS suites included.



Options



M470 is compatible with a large range of potentiostats/galvanostats:

- the original 3300 integrated model
- the premium range SP-200, SP-300, VSP-300 and VMP-300 devices.

Any SP-/VSP-/VMP-configuration offers higher dc current measurement sensitivity and increased EIS bandwidth. Owners of SP-/VSP-/VMP- have the option of purchasing the M470 system with a hardware interface to connect their existing potentiostat.

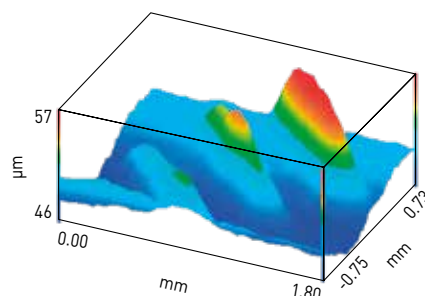
To facilitate mounting of the low current amplifiers local to the electrochemical cell, adjustable stands and brackets are provided which mount directly to the M470 base plate.

SECM150

Compact & Powerful Scanning Electrochemical Microscope

The SECM150 is a new take on high performance and high value scanning probe microscopy. With piezo positioning and capacitive sensors on all axes, the SECM150 is a winning combination for newcomers and experienced users alike.

The system includes the electrochemical cell, standard sample, probes and all electrodes required to perform SECM. Installation and training is provided with a video course that covers unpacking through advanced use of the SECM.



Scan-Lab® Software

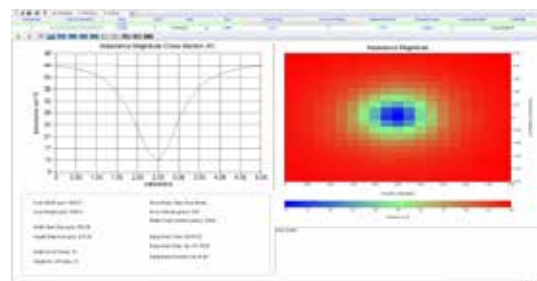
All scanning probe microscopy systems come with **lifetime software updates** that allow the user to benefit from new features.

The user is able to select an experiment from within the technique to provide a powerful user interface, fully configurable with options to save and recall complex setups.

Data can be manipulated within the experiment and allows 2D and **3D heat map** presentations as well as advanced Analysis features. All experiments can be combined in a cutting-edge sequencing engine that incorporates logic elements such as loops, delays, probe movement and more, to provide a powerful research tool now and for the future.

3D-IsoPlot adds a further component to the line-up by providing fully rendered **3D data** display. 3D IsoPlot allows data to be rotated, angled, flipped, scaled, zoomed and more to provide beautifully rendered imagery over a huge range of scales suitable for large posters or projections.

The Microscopic Image Rapid Analysis (MIRA) package rounds off the line-up with 2D and 3D surface analysis features for experiments such as approach curves and area scan imagery. This truly powerful package is gaining popularity due to its strong analytical capabilities.



Probes

The foundation of a great measurement is a great probe, that’s why we provide one of the most comprehensive range of probes, each individually characterized.

Technique	Materials	Options / sizes
SECM / ic-SECM	fused silica & platinum: Ø 4 mm	10, 15, 25 µm
SECM	borosilicate & platinum: Ø 2 mm	1, 2, 5, 10, 15 or 25 µm [*]
SVP	LDPE & platinum	> 5 µm
LEIS	LDPE & platinum	> 5 µm
SKP	brass & tungsten	150 or 500 µm
SDS	PTFE or MACOR	200 or 500 µm
OSP	Optical	Wavelength: 650 nm,

^{*} Each pack includes a 2 mm to 4mm adaptor.



Tools

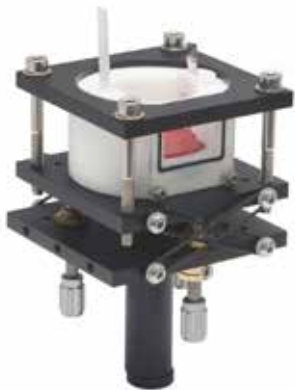
A wide variety of optional accessories are also available, including various probe options, cell options (environmental TriCell, µTriCell, shallow µTriCell) and long working distance optical video microscope (VCAM3). Additionally, the **USB-PIO** module allows the M470 to monitor digital signal levels and switch external hardware synchronized with experiments and movements.



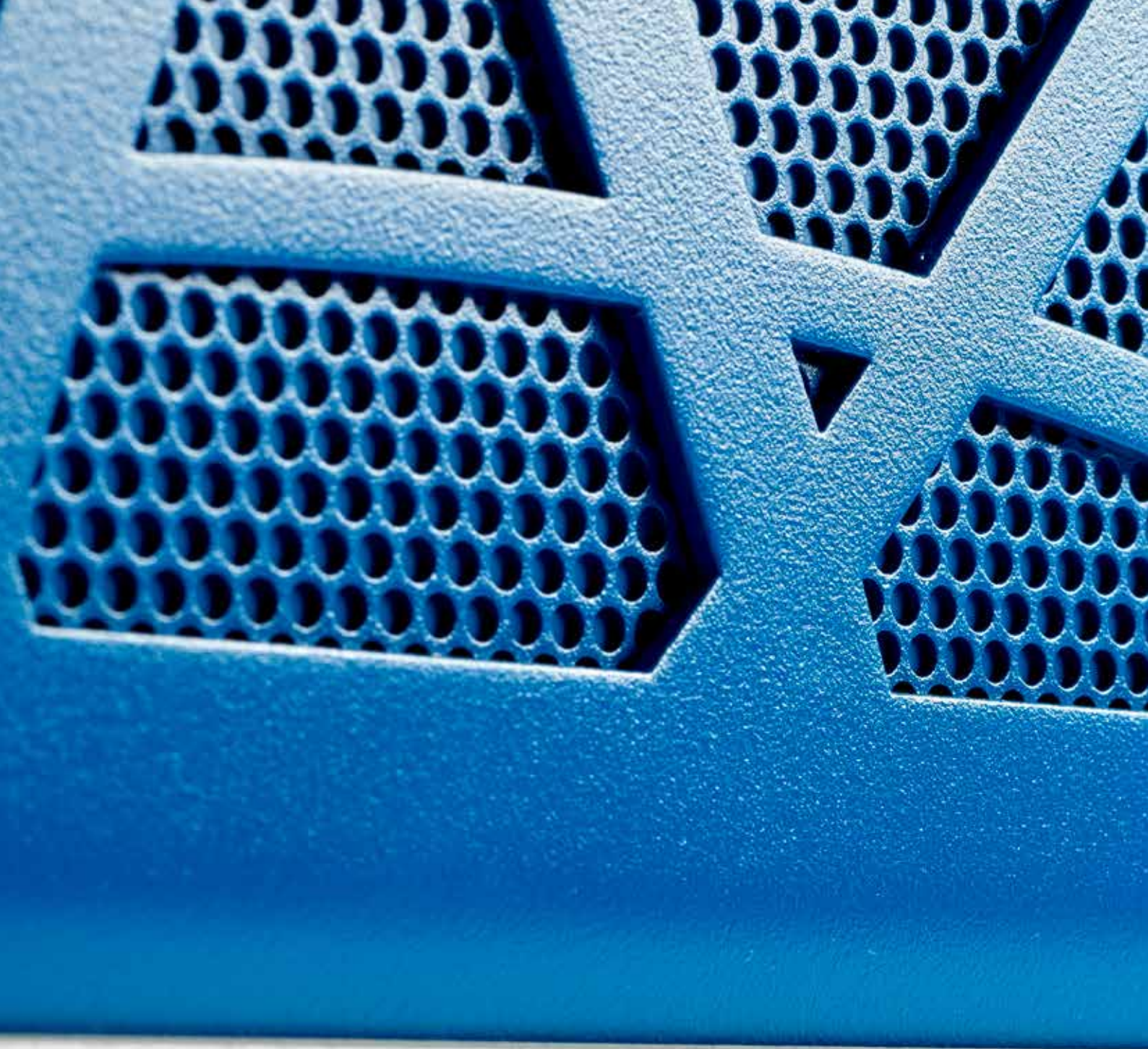
Tricell

Specification

	M470	SECM150
Number of techniques	9 techniques	1 technique
Modular upgradability	yes	no
Positioning resolution	20 nm	10 nm
Scanning range	110 mm	0.2 mm (X, Y) 0.1 mm (Z)
Max. scan speed	10 mm/s	200 µm/s
Piezo positioning	yes (ic-SECM)	yes
Potential range	±10 V	±2.048 V
Current ranges	1 A to 1 pA	1 mA to 100 pA
Analog to digital resolution	24-bit	16-bit
Impedance range (3300)	0.1 Hz to 1 MHz	no
Impedance range (VMP 300)	10 µH to 3 MHz	no
VMP 300 family compatibility	yes	no
Recommended probe sizes	all	<= 5 µm



µTriCell

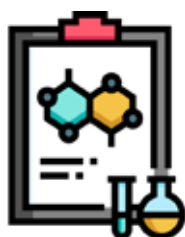


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