BATTERY CYCLERS

BCS-800 Series.

Modularity, performance, power and flexibility

- **High quality EIS: Full scan from 10 kHz to 10 mHz**
- **18-bit A/D converter (40 µV resolution)**
- **HPC measurement down to 6.3 ppm**
- **Modularity from few µA to 120 A**

The BCS-800 series battery cycling system

A system designed to grow with the needs of the battery cycling market

With over 25 years of experience in the design of instruments dedicated to research in battery and intercalation compounds, BioLogic has forged a reputation as a global leader in the production of battery measurement/testing equipment.

Building on this legacy, BioLogic created the BCS-800 Series to extend its general electrochemistry product range, and address the specific needs of the battery cycle/testing markets.

From basic to high-grade research, a specification to suit every research or industrial need. Each BCS-800 series module is made up of 8 channels. To ensure better accuracy in current control and measurement, 5 current ranges are available depending on the model. BCS-815 module channels can be connected in parallel to increase maximum current up to 120 A. And with an 18-bit analog to digital converter for the voltage measurement, the BCS-800 series resolution is an impressive 40 µV. To add even more capability and value, every channel in a module is EIS-capable over a frequency range from 10 kHz to 10 mHz for accurate and fast determination of batteries' internal resistance.

Functionality and modularity to help you work smarter and more efficiently BCS-800 series modules are rack compatible with several sizes available (38U, 24U, 12U and 6U). A communication module provides the individual control and data acquisition on all channels simultaneously, and each module channel is fully independent. Ethernet connection enables each BCS cabinet to connect to a Local Area Network where multiple users can access the instrument(s) and easily follow battery cycling activity. Another clear advantage is the easy backup of cycling data onto a LAN server.

Each BCS-815/BCS-810 module channel enables temperature measurement with K-type thermocouples. Each module also has an analog input/output for interfacing with external devices. Battery tests can be performed accurately by a 4-point measurement.

FEATURES

- Wide EIS scan range to characterize:
  - √ Battery internal resistance (alternative to Current Interrupt method) at high frequencies.
  - √ The diffusion process at low frequencies.
- 18-bit converter (RMSE: 6.3 ppm) and CED tool to perform HPC measurements (short battery cycle duration).
- 5 current ranges with automatic current ranging to optimize current control and measurement.
- Acquisition time of 2 ms for fast-process recording.
- Plug and play module installation. Modules can be added while measurement is running.

OPTIONS

Connection:

- Cell cable from 25 cm to 10 m
- Coin cell holders (2 and 4 points)
- Pouch cell holder
- Cylindrical battery holder
- Current collector to set parallel mode (up to +/-120 A)

Cabinet:

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

BT-Lab®
Powerful, intuitive, battery-testing software

Each BCS-800 Series module is powered by the BT-Lab® interface, a powerful, flexible, user-friendly platform developed through ten years of continual testing.

On-board firmware

The BCS-800 series firmware is a stand-alone operating system in its own right. It is loaded onto the instrument at interface launch with completely autonomous hardware control while the experiment is running. BT-Lab® software is Windows-based and is compatible with either 64-bit or 32-bit operating systems. It is also a multi-device system, able to control several modules simultaneously.

Global view

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

Powerful method

BT-Lab® software allows the user to define critical parameters related to batteries, such as the name, materials, and capacity in the "Battery cell characteristics" section. The controlled current can also be defined as a function of the capacity rate of the cell, allowing the user to create more unique and flexible experiments.

To save time, each setup can be saved and reloaded on all selected channels simultaneously. Users can also use advanced techniques such as the popular GCPL technique. And ModuloBat simplifies programming with 15 control modes for up to 100 sequences (see right).

Intelligent recording conditions

Several recording conditions can be defined, thereby optimizing the number of of data points available. Multiple recording conditions with "OR" commands are used to avoid missing any variation in the cell behavior during the data recording, while also limiting the total data collected to reasonable volumes for faster analysis.

Powerful, embedded graphics package

The BT-Lab® graphic package is embedded with the software and includes powerful tools to create graph templates and analyze data. This package offers a unique trace filtering option by channel resulting 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.

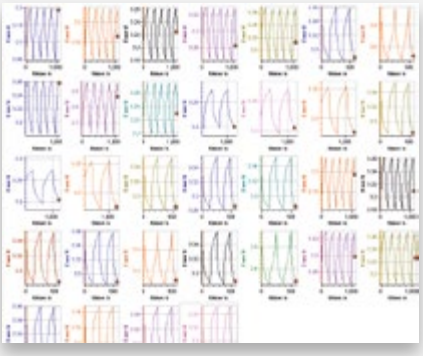
Powerful analysis tools (such as integral, circular or linear fit) are also available in BT-Lab®.

EIS capability

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

Experiment/safety limits

In every sequence of ModuloBat, up to three experimental limits can be selected on measured values such as time, current, voltage, temperature, or on a variation of this value. Different, selectable actions may be taken when a limit is reached, such as "stop" the experiment or "go to the sequence N". Additionally, safety limits can be added on each channel to shut down the channel in the event something goes wrong during the experiment.



ModuloBat: Simplified programming

- 15 control modes:
  - Constant Current/ Voltage/Power/ Resistance
  - Voltage/Current Scan
  - Galvano/Potentio EIS
  - Current Interrupt
  - DCIR
  - Galvano/Potentio ACIR
  - Rest/Loop
  - Urban Profile Import
- Up to 100 sequences
- 3 limits per sequence
- 3 recording conditions per sequence

15 control modes simplify the programming of unique sequences, while an informative, intuitive interface details experiment parameters simultaneously together with the corresponding graph for each selected channel.

Specifications

MODULES

	BCS-805	BCS-810	BCS-815
Channels	8	8	8
Voltage			
Range	0 V to 10 V	0 V to 10 V	0 V to 9 V
Resolution control	150 µV	150 µV	150 µV
Measurement control	40 µV (18 bit)	40 µV (18 bit)	40 µV (18 bit)
Accuracy	<±0.01% of value ±0.3 mV	<±0.01% of value ±0.3 mV	<±0.01% of value ±0.3 mV
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	Down to 800 pA	Down to 8 nA	Down to 80 nA
Measurement control	Down to 0.2 nA (18 bit)	Down to 2 nA (18 bit)	Down to 20 nA (18 bit)
Accuracy	< 0.05% of value ±0.015% of FSR	< 0.05% of value ±0.015% of FSR < 0.1% of value ±0.015% of FSR (1 A range)	< 0.05% of value ±0.015% of FSR < 0.1% of value ±0.015% of FSR (1 A range) < 0.3% of value ±0.04% of FSR (10 A range)
Parallel ability	no	no	Yes Up to ±120 A with 8 channels
EIS			
Built-in	Optional on each module (multiplexed across 8 channels)	Optional on each module (multiplexed across 8 channels)	Optional on each module (multiplexed across 8 channels)
Range	10 kHz - 10 mHz	10 kHz - 10 mHz	10 kHz - 10 mHz
Measurement			
Acquisition time	2 ms	2 ms	2 ms
Time base	2 ms	2 ms	2 ms
Additional measurement			
Thermocouple	NA	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

* FSR: Full Scale Range
Pictures and specifications subject to change.
Specifications given with 2.5 m cell cable.

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Together.