

CONTROLLED LOAD BOX

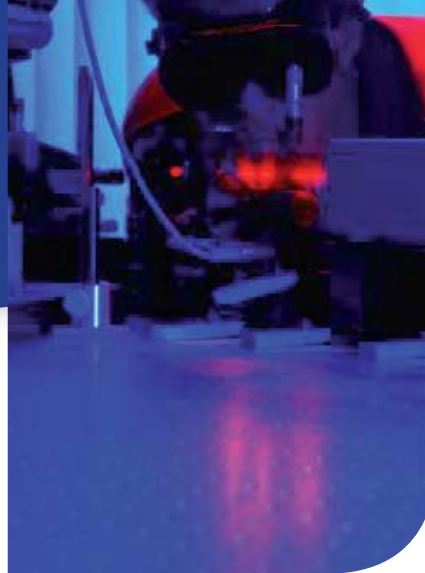
CLB-500 / LB-500



An unique software controlled electronic load ...

... to study the newest energy sources!

- FUEL CELLS
- SOLAR CELLS
- PHOTOVOLTAIC SYSTEMS



The dynamic research on fuel cells and photovoltaic systems requires a dedicated instrument. The Bio-Logic **CLB-500** controlled electronic load box is specially designed for the latest research on devices delivering energy from renewable sources. The CLB-500 couples an electronic load with an EIS capable potentiostat in the same compact chassis.

This **controlled electronic load** handles up to a 500 W load at 50 A / 10 V. Two configurations are available, the controlled stand-alone CLB-500, and the external LB-500. The external LB-500, included in an other chassis, can be controlled by an existing Bio-Logic system, such as the SP-150, VSP, VMP3, or VMP2.

The CLB-500 is PC controlled through a USB or Ethernet connection. Using the Ethernet connection, the CLB-500 can be installed on a Local Area Network to allow remote users access to the instrument. The external electronic load is plug-and-play. It can be connected to and disconnected from one channel board and reconnected to another without shutting down the instrument.

EIS capability is standard, with more than 5 dedicated techniques to control the cell in potentiostatic or galvanostatic mode.

Supplied **EC-Lab® software** offers more than 50 techniques that can be sequenced or linked, and it also includes a wide variety of analysis tools. Analysis options like modelling with Levenberg-Marquardt and Simplex algorithms are available to study materials constituting the cells and ageing.



GENERAL SPECIFICATIONS:

- Controlled electronic load up to 500 W (50 A / 10 V)
- Two current ranges: 50 A, 5 A
- Includes a potentiostat / galvanostat board
- 10 V adjustable reference voltage
- EIS capability from 10 μ Hz to 10 kHz
- Software control with up to 50 techniques
- Load box can be bypassed to use the system as a research grade potentiostat / galvanostat



FUEL CELLS

With the growing interest in new energy sources for electrical and hybrid vehicles, the CLB-500 and LB-500 are the best instruments to study fuel cell elements. Standard EIS capability makes the CLB-500 highly suited for ageing tests on fuel cells. The 50 A /10 V capacity allows the system to be used with fuel cell stacks of up to 10 elements. When coupled with one channel of a VMP3 the LB-500 is a very efficient system to study a complete fuel cell stack by using one channel as the master to control the stack, and the other channels to follow each element of the stack.

EC-Lab® software includes a multisine EIS technique and a very efficient "drift correction" tool allowing EIS measurements on fuel cell while running.

PHOTOVOLTAIC / SOLAR CELLS

Solar cells are a prime target for research on renewable energy sources. The increasing demand for information on solar cells is much easier to meet with the CLB-500. The CLB-500 gives researchers in this field a simple and complete answer to completely characterize a solar cell with standard EIS capability.

Dedicated analysis tools in EC-Lab® software determine short-circuit current, open circuit voltage, maximum power point and the fill factor.

EC-LAB®: A COMPLETE SOFTWARE PACKAGE FOR FULL CONTROL OF THE EXPERIMENT

The powerful EC-Lab® software offers advanced features and tools. More than 50 techniques with up to 100 sequences can be linked to build experiments. Complete graphic tools are provided with the software to achieve advanced analysis and fitting.

TECHNIQUES

Voltammetric techniques

OCV, CV, CVA, CA, CP, SV

Impedance spectroscopy

GEIS, PEIS, SGEIS, SPEIS (Mott-Schottky)

Technique builder

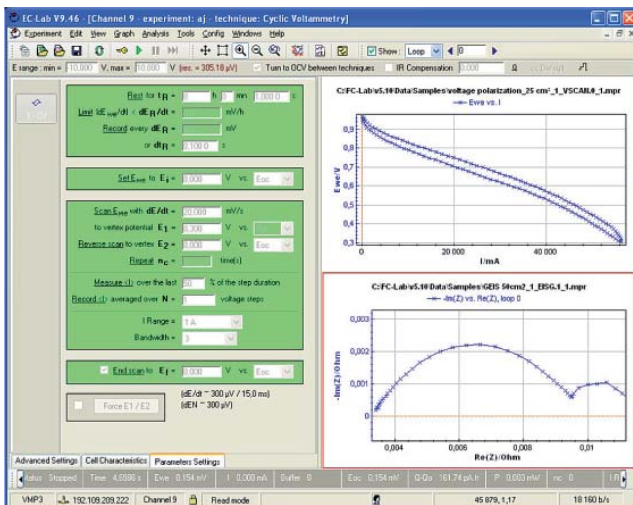
Modular potentio/galvano, Loop, Trigger in/out, Wait

Batteries and fuel cell testing

GCPL (1 to 5), PCGA, CLD, CPW, APGC

Corrosion

Linear and Cyclic Polarisation, Generalised Corrosion, Pitting, ZRA, ZVC



SPECIFICATIONS

CHANNEL BOARD

Cell control

Connection	2, 3, 4 or 5 terminal leads (+ ground)
Compliance	10 V range adjustable from ± 10 V to 0 – 20 V
Maximum current	± 400 mA continuous
Maximum potential resolution	300 μ V on 20 V dynamic range programmable down to 5 μ V on 200 mV range
Maximum current resolution	0.004 % of the dynamic range programmable down to 0.760 pA on the 10 μ A range
Accuracy (DC)	< 0.1 % FSR*
Rise Time	< 2 μ s (no load)
Acquisition time	20 μ s

Current measurement

Ranges	± 10 μ A to ± 400 mA (7 ranges)
Maximum resolution	0.004 % FSR*
Acquisition speed	200000 samples/second
Accuracy (DC)	< 0.1 % FSR*

Potential measurement

Ranges	± 2.5 V, ± 5 V, ± 10 V, ± 10 V adjustable
Maximum resolution	0.0015 % of the range, down to 75 μ V
Acquisition speed	200000 samples/second
Accuracy (DC)	< 0.1 % FSR*

Electrometer

Inputs	3 potential measurements
Impedance	> 10^{12} ohms in parallel with < 20 pF
Bias current	< 5 pA

Auxiliary Inputs / Outputs

2 analog inputs	automatic ± 2.5 V, ± 5 V, ± 10 V ranges
1 analog output	± 10 V
1 input trigger	TTL level
1 output trigger	TTL level

General

Dimensions, weight	260 x 495 x 465 (mm, H x W x D), 23 kg
Power	85-264 V, 47-440 Hz

ELECTRONIC LOAD

Cell control

Connection	5 terminal leads
Compliance	10 V range
Maximum current	50 A, 5 A continuous
Maximum potential	10 V
Rise Time	< 3 ms

Measurement

Current accuracy	< 0.5 % FSR*
Current noise (peak to peak 0-100 kHz)	< 0.05 % FSR*

Electrometer

Inputs	3 potential measurements
Impedance	10^{10} Ohms

Auxiliary Inputs / Outputs

1 security input to open circuit
1 emergency stop push button

IMPEDANCE (EIS)

Impedance

Frequency range	10 μ Hz to 10 kHz
Amplitude	1 mVpp to 1 Vpp 0.1 % to 50 % of the current range
Accuracy	2 %, 2°

Specifications subject to change.
*FSR: Full Scale Range

Bio-Logic, SAS
1, rue de l'Europe
38640 CLAIX - France
Tel.: +33 476 98 68 31
Fax: +33 476 98 69 09
www.bio-logic.info



Bio-Logic USA, LLC
P.O.Box 30009
Knoxville TN 37930 - USA
Tel.: +1 865 769 3800
Fax: +1 865 769 3801
www.bio-logic.us