

EC-800 and EC-825A

Single and Dual Channel Epithelial Voltage Clamps

Our single and dual channel epithelial voltage clamps

EC-825A



CE

- For studies of epithelial transport and the electrical properties of tissue
- High common mode rejection
- Clamp Speed Selection
- Membrane Resistance Measurement Circuit
- Watertight Headstage with Model Membrane

Single Channel EC-800 and Dual Channel EC-825A

Epithelial voltage clamps from Warner provide accurate measurements of transepithelial voltage, short circuit current, and membrane resistance. Important features include fluid resistance compensation, membrane resistance readout, choice of voltage compliance, and small water-tight preamp headstages. Operating modes include voltage clamp, current clamp, voltmeter, and resistance. The dual channel model includes an internal timer.

The **EC-800** and **EC-825A** are state-of-the-art instruments with several unique and important design features offering more reliable recording and operator convenience.

High CMR

Differential voltage recordings are made with very high common mode rejection providing accurate measurements free from the effects of common mode potential changes of a noisy environment.

Membrane Resistance Measurement

Accurate resistance measurements are made with the membrane mounted in the chamber. This measurement is made using a low frequency 2 Hz bipolar signal to avoid polarization of the membrane (ideal for monolayers). Resistances up to 200 kΩ are displayed on the meter with push-button convenience.

Clamp Speed Selection

Three clamp speeds provide optimum recording conditions for a variety of applications. In Fast mode, preparations with low access resistance (small tissues or monolayers) can be clamped with speeds as fast as 10μsec. Typical Ussing chambers with larger tissues will use Medium or Slow modes for stable, oscillation free clamping.

Commands

Internal DC Command (Hold) control for both Voltage clamp and Current clamp modes.

Watertight Headstage with Model Membrane

The small compact headstage can be located close to the measurement site to keep input leads short for reduced noise pick-up. The model membrane circuit simulates a preparation to provide convenient operational checks of the clamp. Internal circuits are protected against the invasion of corrosive saline solutions by a watertight seal.

Choice of Voltage Compliance

The EC-800 has a voltage compliance of ±120 V and the EC-825A has a voltage compliance of ±50 V.

The high voltage compliance of these instruments are important for studies of low resistance (leaky) epithelial cells and in applications in which long agar leads in the current passing circuit produce large voltage drops (which must be compensated). Additionally, the high compliance helps in charging large membrane capacitances typical of epithelial tissues, resulting in faster settling times and improved overall clamp performance.

EC-800 and EC-825A

Single Channel and Dual Channel Epithelial Voltage Clamps (continued)



External Control

The clamp can be operated by an external programmer, lab timer or computer. Logic control of clamp mode and clamp command levels is possible as well as simultaneous mixing of external linear commands.

Onboard Timer Controller

The dual channel EC-825A includes event timers (2) to provide cycle times and clamp durations up to 2000 seconds. Times are set with 2 digit thumbwheel switches and 4 position range switches. Once set, the timer will free run, eliminating the need for a computer or other external device to control the experiment.

Model EC-800LV ± 15 Volt Compliance

Studies with small tissue samples or monolayers in set-ups with low access resistance may not require high compliance. For these applications, models EC-800LV offers both a lower cost and a safer environment for the membrane.

Specifications

EC-800, EC-800LV, EC-825A

Headstage:

Input Impedance	$1 \times 10^{10} \Omega$ shunted by 6 pF
Input Voltage	± 1.5 V maximum
Common Mode Voltage	± 13 V maximum
Common Mode Rejection	100 dB at 60 Hz
Leakage Current	20 pA maximum
Offset Voltage Range	± 120 mV

Voltage Clamp Ranges:

Int. Clamp Potentiometer	± 100 mV with 10-turn control
Ext. Command	± 1 V
Ext. Command Factor	1 mV/10 mV applied

Current Clamp Ranges:

Clamp Potentiometer	± 1 mA
External Command	± 10 mA
Command Factor	1 μ A/10 mV applied
Speed	10 μ sec measured with model membrane

Resistance:

Fluid Resistance	0-100 Ω standard
Compensation Range	0-1 k Ω optional
Membrane Resistance Measurement	(made with 2 Hz bipolar constant current square wave)
Ranges	0-2 k Ω , injected current = 10 nA 0-200 k Ω , injected current = 1 nA

Specifications (continued)

Membrane Resistance	0-2 k Ω , 1mV/ Ω
Output (EC-825A)	0-200 k Ω , 10mV/ Ω
Panel Meter EC-800	3-1/2 digit LCD; Voltage Range: 200 mV max; Current Range: 2000 μ A max
Panel Meter EC-825A	3-1/2 digit LED; Voltage Range: 200 mV max; Current Range: 2000 μ A max

Outputs:

Voltage Monitor	x10
Current Monitor	10 mV/ μ A

Compliance:

EC-800	± 120 V
EC-800LV	± 15 V
EC-825A	± 50 V

Timers (A & B) EC-825A:

Range	10 ms to 1000 secs, set with 2 digit resolution and 4 ranges (each channel)
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Power Requirements

Power Requirements	100-130 VAC or 220-240 VAC, 50/60 Hz, 15 VA
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Physical Dimensions, H x W x D:

EC-800, EC-800LV & EC-825A	8.9 x 43.2 x 30.5 cm
Headstage	7.7 x 7.7 x 5 cm

Shipping Weight:

EC-800 & EC-800LV	6.4 kg
EC-825A	9.1 kg

Warranty

Warranty	Two years, parts & labor
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Order # Model Product

W4 64-0035	EC-800	Single Channel Voltage Clamp with ± 120 V Compliance* for Leaky Tissue
W4 64-1508	EC-800	Single Channel Voltage Clamp with ± 120 V Compliance* for Leaky Tissue, 200 - 240 VAC
W4 64-0036	EC-800LV	Single Channel Voltage Clamp with ± 15 V Compliance* for Tight Tissue and Culture Type Monolayers
W4 64-1509	EC-800LV	Single Channel Voltage Clamp with ± 15 V Compliance* for Tight Tissue and Culture Type Monolayers, 200 - 240 VAC
W4 64-1605	EC-825A	Dual Channel Voltage Clamp with ± 50 V Compliance*

*Supplied with rack mount hardware.