

Model 2400

Patch Clamp Amplifier



The Model 2400 Patch Clamp Amplifier is a low noise, full featured patch clamp designed for voltage clamping using patch electrodes on single channels or whole cells. Amplifier current gain can be matched to your experimental needs by selecting one of the three available dual resistive feedback probes. Currents with outputs of 10mV/nA to 1mV/fA can be recorded. (See Specifications on the reverse side for details).

Unlike other patch clamp amplifiers, the Model 2400 has a voltage follower in the probe. This allows this amplifier to be a true fast current clamp amplifier with no instability. An integrated four pole low pass Bessel filter provides flexible signal conditioning. Fine tuning capacity compensation is available to eliminate virtually all electrode-induced transients. Calibrated whole cell compensation provide easy display of membrane capacitance and access resistance. A host of command potentials include an automatic tracking command to zero the membrane current, manual controls for offset and holding potentials, and an easily readable digital display. For signals that are more complicated, an external command input with different scaling factors is available for use with any signal source.

A digital meter provides accurate values of command signals and membrane currents or voltages, the true RMS noise of the amplifier and experimental setup, the cut off frequency of the low pass filter, and the overall gain of the amplifier plus probe. Series resistance compensation provides the researcher with the option of introducing either or both predictive and corrective compensation from zero to 100%. Fine and coarse controls for lag provide sensitive control to minimize oscillation produced by compensation close to 100%. Separate compensation controls exist for eliminating transients seen during current clamp experiments when the bridge balance is used.

Telegraph outputs, which provide analog voltage equivalents of amplifier mode, gain, C_{membrane} , RMS noise, and the low pass filter settings, allow your system software to record the Model 2400's front panel settings during the course of your experiment.

The Model 2400 Patch Clamp Amplifier can be your lab's workhorse amplifier for a fraction of the price of other instruments on the market. Perfect for research or teaching applications.



Dual Resistive-Feedback Headstage

- Full-function Patch Clamp for both whole cell and patch recordings
- True current clamp due to voltage follower in headstage
- Switchable dual resistive feedback headstage
- Capacity, series resistance, and whole cell compensation
- 4-pole low-pass Bessel filters
- Internally generated test signals
- Telegraph outputs for all major front panel controls
- Built-in display for critical values
- Includes rack mount hardware
- 3-year warranty

Model 2400

Patch Clamp Amplifier



Specifications

Probe Gain and Bandwidth	
Feedback Resistor	Probe Gain Maximum Current Minimum Bandwidth
10 Megohm	10 mV/nA 1000 nA 100 kHz
100 Megohm	100 mV/nA 100 nA 100 kHz
1 Gigohm	1 mV/pA 10 nA 60 kHz
10 Gigohm	10 mV/pA 1 nA 40 kHz
Noise Voltage clamp modes measured with internal 4 pole Bessel filter:	
	Headstage Resistor (ohms) 10M 100M 1G 10G
	Bandwidth = 1kHz 0.003nA 0.5 pA 0.17 pA 0.08 pA
Current clamp modes have noise levels less than 20µV with inputs shorted.	
Membrane Current Output Range	Probe Feedback Resistor Output Range
	10 Meg 10mV/nA-1V/nA
	100 Meg 100mV/nA-10V/nA
	1 Gig 1mV/pA-100nV/pA
	10 Gig 10mV/pA-1V/pA
Membrane Voltage Output Range	10mV/mV-1V/mV
Filter	4 pole Bessel filter: 0.5 kHz, 1.0 kHz, 2.0 kHz, 5.0 kHz, 10.0 kHz, 20.0 kHz, and open.
Capacity Compensation	Voltage clamp: FAST1: 0-10pF, 0.2-2µs FAST2: 0-1pF, 0.1-10ms
	Current clamp: FAST1: 0-10pF No FAST2
Whole Cell Compensation	Raccess: 0-100 megohm, Cmembrane: 0-100pF
Series Resistance	RsPre: 0-100% RsComp: 0-100% LagCoarse: 1-100µs LagFine: 1-10µs
DC Balance	Up to the value of the low feedback resistor in the probe

References

- Smith AJ, Sugita S, and Charlton MP. (2010) Cholesterol-dependent kinase activity regulates transmitter release from cerebellar synapses. *J Neuroscience* 30(17): 6116-6121
- Del Negro CA et al. (2009) Asymmetric control of inspiratory and expiratory phases by excitability in the respiratory network of neonatal mice in vitro. *J Physiology* 587: 1217-1231
- Olsen SR and Wilson RI. (2008) Lateral presynaptic inhibition mediates gain control in an olfactory circuit. *Nature* 452:956-960
- Yao CA, Ingell R, and Carlson JR (2005) Chemosensory coding by neurons in the coeloconic sensilla of the *Drosophila* Antenna. *J Neuroscience* 25(37): 8359-8367

Ordering Information

- For use on 220 V / 50 Hz power systems: Product #880005 *Country-specific power cords are not supplied.*
- For use on 110 V / 60 Hz power systems: Product #880000
- Headstage Options:
- Product #880210 1 Gig / 10 Meg feedback resistors
- Product #880218 10 Gig / 10 Meg feedback resistors
- Product #880222 10 Gig / 100 Meg feedback resistors

All units include a product manual and rack mounts. One Product #8802xx Headstage probe *must* be purchased at time of ordering for proper operation of the instrument.

Distributed By:

A-M Systems
131 Business Park Loop
PO Box 850
Carlsborg, WA 98324
USA

Toll-free: **800-426-1306 (USA)**
Phone: **360-683-8300**
FAX: **360-683-3525**
E-Mail: **sales@a-msystems.com**
Website: **www.a-msystems.com**