AXOPATCH

Advantages

Pipette Offset

The Axopatch 200B amplifier provides ±250 mV of offset potential.

Seal Test

The convenient seal test may be used in voltage clamp mode (5 mV pulse) or in current clamp mode (50 pA (ß=1) or 500 pA (ß=0.1).

Dual Command Potentials

Two separate command potential inputs allow you to sum command input signals from two different sources. The back panel command is scaled to afford greater range (up to ±1V), and so is quite useful for electrochemical measurements.

Holding Command

The Holding Command of the Axopatch 200B has been enhanced over that of its predecessors with the addition of a X1 and X5 switch that allows you to choose either 0 - 200 mV or 0 -1 V ranges. An ON/OFF switch can disable this control when an external command from a computer is used to establish the holding potential.

Pipette Capacitance Compensation

In operation in both voltage- or current-clamp modes, controls the magnitude and tau of two time constants, Fast and Slow.

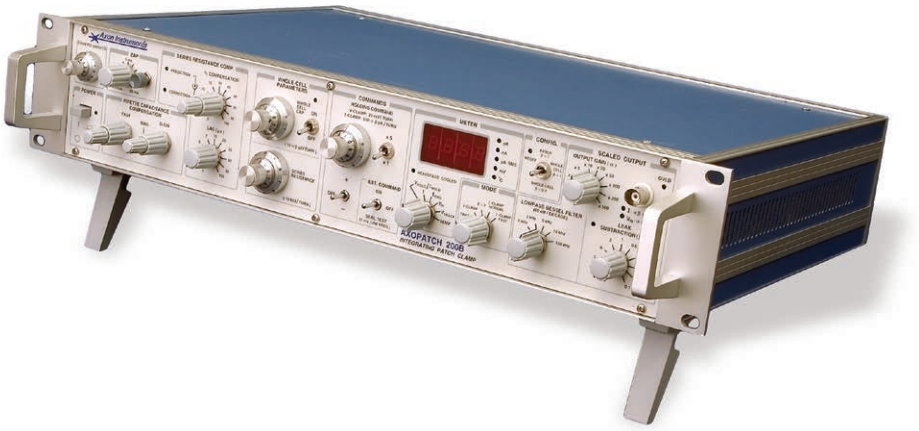
Cell Capacitance Compensation

Compensate up to 100 pF (ß=1) or 1000 pF (ß=0.1) to allow recording from a large range of cell sizes.

Output Gain

Ten gain settings spanning a 1000-fold range may be selected to scale the output to the most desirable level, a range double that previously available.

Bringing patch-clamp noise down to unprecedented levels.



Axopatch 200B Amplifier

The Axopatch 200B patch clamp offers the lowest-noise patch-clamp amplifier technology. The open circuit (amplifier) noise in patch-mode has been reduced to unprecedentedly low levels: < 15 femtoAmps (rms) below 1 kHz bandwidth, < 60 femtoAmps (rms) below 5 kHz bandwidth, and < 130 femtoAmps (rms) below 10 kHz bandwidth, all measured with an 8-pole Bessel filter. Noise is still low (145 femtoAmps rms below 10 kHz bandwidth) with a pipette holder attached. This translates into lower noise during actual recordings; this noise performance is achieved in part by cooling the input field-effect transistors inside the headstage to well below 0° C.

Better noise performance is only part of the story. The redesigned, slim headstage improves electrode access to the preparation by making it easier to fit under your microscope. We now include BOTH whole-cell ranges (previously available only in two separate headstages) in one headstage.

The 200B amplifier includes all of the features of the 200A amplifier, and a few more. Enhancements include three recording configurations in a single headstage (one patch and two whole cell ranges, with capacitance compensation ranges of 100 pF and 1000 pF), increased voltage and current command ranges (to ±1V) for electrochemical measurements, built-in capacitance dithering capability for capacitance measurements, and addition of series resistance compensation to the current clamp circuitry to improve performance. Seal Test now provides current steps in current clamp mode as well as voltage steps in voltage clamp mode. Leak Subtraction is now more

sensitive in the most important resistance range. The recording bandwidth has been doubled to up to 100 kHz. Command and bandwidth ranges are larger. Series Resistance compensation is now active in current clamp as well as in voltage clamp mode to enable bridge balance to be used.

A Superb Instrument

The Axopatch 200B amplifier is the latest version of the premier Axon Instruments patch-clamp amplifier incorporating the innovative Capacitor-Feedback technology for single-channel recording, and resistive-feedback for whole-cell recording, providing the best possible performance for single-channel and whole-cell patch clamping. Convenient features include ZAP (to rupture patches when going whole cell), dual-speed current clamp (to allow faster current clamping in small cells), Holding Command to set voltage commands in voltage clamp and current commands in current clamp, and a choice of three gain settings on the dedicated current output (for patch, whole-cell and loose-patch modes). The Axopatch 200B amplifier provides the lowest-noise single-channel recording available. The amazingly low open-circuit noise of 0.13 pA rms (10 kHz) increases to only 0.145 pA rms when a patch-pipette holder is attached to the headstage input and the pipette capacitance is fully compensated (to eliminate capacitance charging transients). The power of capacitor-feedback technology is capacitor feedback at room-temperature is clearly superior to resistive feedback technology; cooled capacitor-feedback is even better! An unprecedented achievement in the field of ultra-low noise recordings!

Unparalleled Performance, Utility and Ease of Use

Efficient controls for whole-cell capacitance compensation, a unique "super-charging" form of series-resistance compensation that complements the conventional "correction" form, and a variable LAG control; output gain with 1000-fold dynamic range; 4-pole Bessel filter; onboard leak subtraction; dual external-command inputs; versatile panel meter displaying Holding Command, rms current noise, membrane potential, tracking potential and current at the headstage input; telegraph output of values for output gain, filter frequency, headstage mode (gain) and measured cell capacitance; ZAP; and dual-speed current clamp. Also, with the Axopatch 200B amplifier the bath is grounded for convenience of use and straightforward addition of command and compensation potentials.

Quiet Single-Channel Recording

Integrating Headstage Mode

With unprecedented low noise and superb linearity, the Axopatch 200B capacitor-feedback integrating headstage is ideal for measuring sub-picoamp current signals.

Bilayers

Headstages useful in artificial bilayer experiments must be stable with large input-capacitance loads. The Axopatch 200B amplifier is rock solid with an input capacitance of 1000 pF.

Superb Whole-Cell Performance

Resistive Headstage Mode

In whole-cell recording more current noise is produced by the cell and the environment than by the patch clamp amplifier. Hence, the benefits of a low-noise capacitor-feedback headstage cannot be effectively utilized in whole-cell mode. For this reason, the Axopatch 200B amplifier uses traditional resistor feedback headstage electronics for the whole-cell mode of patch clamp recording. The CV 203BU headstage includes two feedback resistors to provide a wide range of current-passing capacity in the whole-cell mode. The 500 megaohm feedback resistor (ß=1) provides both low noise and a large current passing ability (20 nA). For larger currents, one can switch to the 50 megaohm feedback-resistor (ß=0.1) to pass up to 200 nA.

DIGIDATA ACQUISITION

Specifications

Analog Inputs

- Input channels: 8 single-ended
- ADCs: 8
- Sampling rates**: 1 Hz - 500 kHz
- Resolution: 16-bit
- Input range: -10 to +10 V
- Input resistance: >1 MΩ
- Gain value: 1

**Maximum aggregate throughput rate is 500 kHz x 8 input channels = 4 Megasamples/sec

Analog Outputs

- Channels: 8
- DACs: 8
- Sampling rates: 1 Hz - 500 kHz
- Resolution: 16-bit
- Output range: -10 to +10 V
- Output impedance: < 0.5 Ω
- Output short circuit to signal ground: ±25 mA

Digital Inputs

- Input type: TTL compatible
- Trigger Inputs
- Input type: TTL compatible
- TAG: rising-edge sensitive
- START: rising-edge sensitive

Digital Outputs

- Number of bits: 8 (of 16) supported in software
- SCOPE: dedicated trigger output
- Output driver: advanced CMOS (AC) compatible
- Output current: ±4 mA source, ±32 mA sink

Cable

Type: USB 2.0 braided
Length: 3 meters

AxoScope

AxoScope software is turn-key data acquisition and analysis software for Windows, designed to replace oscilloscopes, chart recorders, and FM tape recorders. AxoScope software provides up to sixteen channels of analog acquisition and four different acquisition modes. Acquire data continuously in Gap-Free mode with simultaneous display, at up to the speed of the digitizer. Set a trigger threshold for the Fixed-Length Events, Variable-Length Events or High-Speed Oscilloscope modes. Tag and add comments to the data in real time. Set analog output holding values. Open Axon-format ABF data files and quickly analyze sections of interest with an array of browsing and basic analysis tools. Preview data and page layout before printing. Additional features include voice tags, which allow tagging of data with spoken comments (requires a microphone and sound card), low-pass and high-pass digital filtering of incoming data, and Store Trace, which freezes a snapshot of a waveform on the screen for comparison with subsequent input.

The Digidata 1550B rack mountable main unit comes standard with:

- USB 2.0 cable
- External auto-switching power supply
- Power cable
- AxoScope 10 software CD
- Printed manual

Ordering Information

Part No.	MDS Analytical Technologies/Axon CNS
MultiClamp	**MultiClamp 700B** computer-controlled current & patch clamp amp
Axoclamp	**Axoclamp 900A** computer-controlled current & voltage clamp
Axopatch	**Axopatch 200B-2** capacitor feedback patch clamp amp
SoftPanel	**SoftPanel (USB)** optional control panel
Digidata 1550B0	**Digidata 1550B0** data acquisition system
Digidata 1550B1	**Digidata 1550B1** data acquisition system with 1x HumSilencer
Digidata 1550B4	**Digidata 1550B4** data acquisition system with 4x HumSilencer
pCLAMP	**pCLAMP 11 Standard** electrophysiology software (Windows)
pCLAMP Upgd	**pCLAMP 11 Upgrade** available for previous versions of pCLAMP
Mo-1-CV-7B	**Headstage CV-7B** patch clamp (standard) for MultiClamp 700B
Mo-HL-U	**Electrode holder** for all Universal (U)-type headstages
Mo-HS-9A-x10U	**HS-9A headstage** for Axoclamp 900A (choose x0.1, x1, x10 U)
HL-U	**Electrode Holder** for 1.0-1.7 mm glass
	Complete Axon CNS cellular neuroscience product line avail.