



GETTING INSTRUMENTS, INC.

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Description:

The Getting Model 5A MICROELECTRODE AMPLIFIER is a low-noise amplifier designed for intracellular recording and stimulation. It consists of a main rack-mountable chassis (blue with white letters) containing all the controls and a small remote probe housing the input head-stage. This amplifier has a number of controls that are useful for intracellular recordings, such as Capacitance Compensation, "Buzz", Electrode Impedance Check, Bridge Balance (Stimulus Cancel), and Position. Current can be injected either by an internal DC Current Level control or by two external Stimulation Inputs, and the total injected current is available at the Current Monitor output. The Output can be filtered at 0.1, 1.0, or 10.0 kHz and has a gain of x10.

Theory of Operation:

- **Input Probe:** The input probe consists of a small box (1.25" x 1.25" x 2") connected to the main chassis by a five-foot flexible cable. Microelectrodes are connected to the probe via a flexible shielded cable up to 14" in length. The shield of the cable is driven to reduce capacitance and increase rise-time. Since the electrode is not connected directly to the probe housing, a variety of electrode holders can be used to suit your particular requirements. The unit is provided with two input cables.
- **Amplification:** A single x10 output is provided (BNC connector). A selectable high frequency output filter (Low Pass Filter) is built in with cutoff frequencies of 100 Hz, 1 kHz, and 10 kHz.
- **Capacitance Compensation:** Stray capacitance can be compensated by adjusting a 10-turn potentiometer on the main chassis. In addition, the MODEL 5A is equipped with a "BUZZ" button which causes the amplifier to oscillate. This feature is useful for penetrating cells without having to change the capacitance compensation setting.
- **Current Injection:** Current can be injected through the microelectrode while simultaneously recording membrane potential. The MODEL 5A provides both a built-in current source and two external inputs. The built-in source is controlled by a switch for current polarity (hyperpolarizing, off, depolarizing) and a potentiometer for current magnitude (range 0-10 nA). Externally applied voltage waveforms can be converted into current stimuli of the same waveform. Two external stimulus inputs (BNC connectors) are provided. Signals applied to these inputs sum internally so that complex current waveforms can be achieved easily. Voltage-to-current conversion is 1 nA per 100 mV. A current monitor output (BNC connector) is provided which measures the total current injected through the electrode. Calibration: 1 nA/100 mV.
- **Bridge Circuit:** The bridge circuit cancels the voltage generated by the electrode during current injection. The standard bridge is equipped with a 10-turn potentiometer and is for use with electrodes up to 200 megohms; however, the bridge can be modified for use with higher resistance electrodes.

- **Position Control:** Adjusts the DC output level with a 10-turn potentiometer on the main chassis.
- **Electrode Test:** The resistance of the electrode is measured by depressing an electrode test button. Calibration: 1 megohm per 10 mV at the output.
- **Power:** Each main chassis contains a regulated + 15 VDC power supply. The AC power requirements are either 110 VAC (60 cycles) or 220 VAC (50-60 cycles).

Microelectrode Amplifier Specifications	
Input impedance	10 ¹¹ // 2 pF min. (typically > 10 ¹¹ ohms)
Input voltage range	+/- 1 Volt
Output	Single-ended, gain x10 (fixed)
Output impedance	Less than 100 ohms
Output filters	Three selectable ranges; DC to 100 Hz, DC to 1 kHz, DC to 10 kHz
Rise-time	40-50 microseconds (with 10 megohm source resistance and capacitance compensation adjusted for no overshoot)
Noise	40 µVolts RMS (200 µVolts peak-to-peak), DC-10 Kc with 10 megohm source resistance
Leakage current	Adjustable to zero
Current injection	Mode A: Built-in DC source with adjustable magnitude (0-10 nA standard) and switchable polarity Mode B: Two external inputs convert voltage to current (1 nA per 100 mV)
Maximum current:	5 volts or 10 amps / elect. resist.
Current monitor	Built-in current monitor measures total current injected through the electrode Calibration: 100 mV per nA
Electrode test	Electrode resistance test button built-in
Capacitance compensation	Capacitance compensation
Ground	Chassis and circuit grounds are isolated

Quote requests, orders and technical support:

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