

IE-251A

Intracellular Electrometer

A moderately priced intracellular electrometer complete with current passing capability



The **IE-251A** is a moderately priced intracellular electrometer, complete with current passing capability, incorporating the same basic design as the more costly IE-210. The important features required for low noise, drift free recording from glass microelectrodes have been retained in this lower cost model. The IE-251A is easy to use and an excellent choice for the budget-conscious researcher or student teaching lab.

The IE-251A features a very small active headstage, essentially the same as used with the more costly IE-210. Epoxy-sealed construction affords maximum resistance to saline corrosion. Its small size and low mass permit easy mounting in a micro-positioner. The electrode holder supplied connects directly to the probe input.

The amplifier features include:

- Fixed gains are at x1 and x10.
- Capacity Compensation neutralizes input capacitance up to 50 pF.
- Junction potentials up to ± 200 millivolts are nulled with the DC Position control.
- Electrode Test provides convenient electrode resistance check.
- Push button operated Buzz produces oscillations at pipette tip to facilitate cell impalement.
- Convenient Probe Test port permits fast check of amplifier performance.

Current Injection

The injection circuitry of the IE-251A allows simultaneous stimulation and recording through microelectrode resistances up to 1 G Ω in two ranges. Voltages at the Stimulus Input are converted to constant currents applied to the electrode. The steady state and transient components of the current injection artifact are nulled with the DC and transient balance controls. The corrected signal is viewed at the single-ended bridge output. Electrode resistance is read from the DC balance ten-turn dial.

Overdrive Indicators

Two visual indicators call attention to overload conditions:

- Input Overdrive is illuminated whenever the probe input voltage exceeds ± 1 V, caused by either excessive current through the microelectrode or an open circuit (open or blocked electrode).
- Current Overdrive warns of excessive voltage (>50 V) applied to the Stimulus Input.

This Intracellular Electrometer is supplied with a probe. An Electrode Holder must be purchased separately based on your glass outer diameter. Also, specify line operating voltage if other than 100-130 VAC.

Specifications

Amplifier:

Input Impedance	$>10^{10}\Omega$ shunted by 0.5 pF
Noise Level	(0.1 Hz to 10 kHz)* 25 μ V p-p input shorted 250 μ V p-p, 20 M Ω at input
Output Resistance	100 Ω
Gains	x1 and x10
Rise Time (10 to 90%)	10 μ sec measured with 20 M Ω resistor
Capacity Compensation	0 to 50 pF
Probe Input Voltage Range	± 1 V
DC Positioning Range	± 200 mV referred to input
Leakage Current	Adjustable to zero
Electrode Test	1 mV/M Ω

Buzz:

Amplitude variable	0 to 15 V
Frequency variable	100 Hz to 10 kHz

Current Injection:

Balance Ranges	0 to 100 M Ω and 0 to 1000 M Ω
Current Injection Limit	± 1 V divided by electrode R or 0.5 μ A, whichever occurs first
Stimulus Input Resistance	3.3 k Ω
Maximum Stimulus Input	± 50 V
Bridge Bal. Output Resist.	100 Ω
I Monitor Output Resist.	1 k Ω
I Monitor Output Scale Factor	1V = 50 nA

Power Requirements	100 to 130 or 220 to 240 V, 50/60 Hz, 10 VA
--------------------	---

Physical Dimensions:

Case Size	12.5 x 20.3 x 25.4 cm (H x W x D)
Probe	9.5 mm x 6.5 cm (D x L) with 1.8 m L cable
Probe Handle	6.5 mm x 6.5 cm (D x L)

Shipping Weight	4.5 kg
-----------------	--------

Warranty	Two years, parts & labor
----------	--------------------------

* At x1 output.

Order #	Model	Product
W4 64-0090	IE-251A	Intracellular Electrometer Electrode Holders for IE-210/251A, 110 VAC
W4 64-1514	IE-251A	Intracellular Electrometer Electrode Holders for IE-210/251A, 200/240 VAC
W4 64-0964	ESP/W-F10N	Electrode Holder, Straight 1.0mm glass OD for IE-210/251A
W4 64-0965	ESP/W-F12N	Electrode Holder, Straight 1.2mm glass OD for IE-210/251A
W4 64-0966	ESP/W-F15N	Electrode Holder, Straight 1.5mm glass OD for IE-210/251A
W4 64-0967	ESP/W-F20N	Electrode Holder, Straight 2.0mm glass OD for IE-210/251A

Optional Accessories

W4 64-0043	2510	Replacement Headstage
-------------------	------	-----------------------