# DP-311

## Differential Amplifier with Active Headstage

***The DP-311 AC/DC differential pre-amplifier is highly suited for EEG, EKG and extracellular recording***



- Excellent common mode rejection: 120 dB at 60 Hz
- Small active headstage which can be mounted in micromanipulators
- Suitable for use with high impedance glass or metal microelectrodes

The **DP-311 AC/DC Differential Amplifier** is highly suited for EEG, EKG and extracellular recording using glass or metal microelectrodes. Features include high input impedance, high common mode rejection [120 dB at 60 Hz], low noise, high gain, high DC tolerance, bandwidth filtering and an active headstage.

### High Input Z, High CMR

High common mode rejection is very important in minimizing electrical interference. The high input resistance of the DP-311 Series ($10^{12}\ \Omega$ typical) ensures that the instrument's high CMR will not be degraded by differences in source impedance at the input. This is important in extracellular recording, where the difference in resistance of the recording and indifferent electrode is often large.

### High DC Tolerance

Extracellular action potentials are typically measured in microvolts but are usually accompanied by much larger DC electrode voltages. The DP-311 is designed to amplify these microvolt level events with as much as ±2 Volts DC at the input.

### High Gain, Low Noise & Bandwidth Limiting

With gain selections at x10, x100, x1000 and x10,000, even microvolt signals are sufficiently amplified for computer and recorder inputs. Noise is very low, typically 8 µV p-p at 1 Hz to 10 kHz bandwidth. Reducing the bandwidth with the low pass and high pass filters further lowers noise.

### Calibration Signal

An internal Cal signal provides a convenient check of amplifier gain and operation.

### Specifications

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|---|---|
| Voltage Gain, AC & DC | x10, x100, x1,000 & x10,000 |
| Input Resistance | $10^{13}\Omega$ typical |
| Leakage Current | 1.0 pA typical |
| Common Mode Rejection | 120 dB min (1,000,000 :1) at 60 Hz |
| Noise, Input Shorted | 8 µV p-p, 1 Hz to 10 kHz typical,<br>≈ 14 nV/$\sqrt{\text{Hz}}$ @ 10 KHz Maximum |
| Low Frequency (high pass) Filter Settings | DC, 0.1, 1.0, 10 & 300 Hz |
| High Frequency (low pass) Filter Settings | 0.1, 0.3, 1.0, 3.0 & 10, 50 kHz |
| Offset Control Range | ±600 mV min at output, any gain set |
| Calibration Signal | 1 mV p-p at 100 Hz |
| Max. Common Mode Signal | ±2 V |
| Output Voltage Swing | ±10 V (±5 V in gain of 10) |
| Output Resistance | 50 Ω |
| Input Connectors | 2 mm male pins, 0.5" in (12.7 mm) spacing |
| Output Connector | BNC |
| Power Requirements | 90 to 270 VAC, 50/60 Hz, 10 VA |
| Physical Size, H x W x D | 5.1 x 21.25 x 18 cm |
| Shipping Weight | 2.3 kg |
| Warranty | Two years, parts and labor |

| Order # | Model | Product |
|---|---|---|
| **W4 64-1422** | DP-311 | Differential Amplifier |
| **W4 64-1423** | 3110 | Replacement Headstage |
| **W4 64-1323** | PJ2-5 | 2 mm Jack uninsulated, pkg. of 5 |