The Model 1212 current preamplifier is designed as a low cost, general purpose, bench top instrument to provide a high performance detection system for small ac and dc currents. The 1212 operates with a virtual ground at its input which mitigates unpredictable high frequency roll off due to input cables and stray capacitance. The zero input impedance also allows photodiode detectors to operate linearly over a very wide dynamic range and photomultiplier tubes to operate with minimal distortion.
It is optimized to have the widest bandwidth consistent with standard lock-ins, yet not be over peaked when operated with moderate capacitance transducers such as small area PIN photodiodes. Models 1211 and 1641, by comparison, are more highly damped, and work with higher capacitance input devices. The 1212 is switchable for operation directly from an ac power line or from internal, sealed, lead-acid, rechargeable batteries.

The input stage of the 1212 utilizes a low noise configuration (7nV $\sqrt{Hz}$ typical) which assures good noise performance in the presence of adverse input shunt capacitance to ground. Likewise, the output noise (typically under 40nV $\sqrt{Hz}$) contributes little to the system noise- particularly at $10^{-5}$ A/V sensitivity and above, where output noise is dominated by Johnson noise of the feedback resistor, R.

The 600 Ω front Panel output BNC is short circuit proof and may be loaded by over 20 feet of 50 Ω coaxial cable before significant high frequency roll off occurs. The internal output buffer makes the 1212 immune to any capacitive loading effects at the output, resulting in stable operation even when both the input and output have large capacitive loads.

**SPECIFICATIONS**

**SENSITIVITY:**  $10^{-4}$ to $10^{-9}$ ampere/volt with five decade current gain ranges.

**dc GAIN ACCURACY:**  ±1% max

**dc OPEN LOOP GAIN:**  >250,000

**INPUT LEAKAGE CURRENT:**  ± 25 pA max @ 25°C

**INPUT OFFSET VOLTAGE:**  Adjustable to 0 V

**POWER CONSUMPTION:**  105-130 Vac or 210-260 Vac  47/440 Hz, 40W

**BATTERY OPERATION TIME:**  20 Hours
RECHARGE TIME: 8 Hours

OUTPUT SWING: 15V p-p (5Vrms) min

OUTPUT IMPEDANCE: 600Ω

OUTPUT POLARITY: inverted

OVERLOAD DETECTION: Before nonlinearity (± 9V typical)

OPERATION TEMPERATURE: 5°C to 70°C

DIMENSIONS: 320 x 137 x 66mm (2.6 Inch x 5.4 Inch x 12.6 Inch)

WEIGHT: 3 kg (6.5lb)

Model 1212 Block Diagram
<table>
<thead>
<tr>
<th>Range A/V</th>
<th>Full Scale p-p</th>
<th>Min 3 dB Frequency*</th>
<th>Open Circuit Input Noise **</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^{-9}$</td>
<td>10nA</td>
<td>4 kHz</td>
<td>$5.0 \times 10^{-15}$</td>
</tr>
<tr>
<td>$10^{-8}$</td>
<td>100nA</td>
<td>12 kHz</td>
<td>$1.3 \times 10^{-14}$</td>
</tr>
<tr>
<td>$10^{-7}$</td>
<td>1µA</td>
<td>45 kHz</td>
<td>$4.1 \times 10^{-14}$</td>
</tr>
<tr>
<td>$10^{-6}$</td>
<td>10µA</td>
<td>100 kHz</td>
<td>$1.3 \times 10^{-13}$</td>
</tr>
<tr>
<td>$10^{-5}$</td>
<td>100µA</td>
<td>180 kHz</td>
<td>$5.0 \times 10^{-13}$</td>
</tr>
<tr>
<td>$10^{-4}$</td>
<td>1mA</td>
<td>200 kHz</td>
<td>$3.0 \times 10^{-12}$</td>
</tr>
</tbody>
</table>

* for small capacitance loading at input

** Johnson noise from free feedback resistor plus amplifier voltage noise at room temperature, typical

** ac Characteristics
Input Impedance

Frequency Response vs Source Shunt Capacitance
Frequency Response vs Source Shunt Capacitance

Maximum Sinusoidal Output Swing vs Frequency
For more information please contact:

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