

# PiezoDrive

## PDL200

200 V Linear Amplifier  
with Dynamic Current Control™



The PDL200 is a 200 Volt linear amplifier designed to optimize the performance of multilayer piezoelectric stack actuators. The PDL200 is compact in size but provides a level of performance not currently available from commercial amplifiers.

The PDL200 contains a new proprietary output stage with Dynamic Current Control that provides exceptionally large output currents for short periods of time. Compared to a standard voltage amplifier, the PDL200 provides three times greater power bandwidth and up to six times faster rise-time. A plot of the allowable overload current versus time is shown in on the right.

In addition to the fast response, the PDL200 also produces extremely low noise. This is ideal for precision positioning applications where subatomic resolution is required. Other features that make the PDL200 suitable for scientific and industrial applications include the compact size, ease-of-use, and ability to drive any capacitive load.

The PDL200 is housed in a rugged desktop enclosure with no fan or vents and can be mounted into a standard Eurocard subrack, or onto a DIN rail.

A detailed discussion of the performance specifications is contained on the following page.

Specifications	
<b>Peak Current</b>	±600 mA
<b>Average Current</b>	±100 mA
<b>Voltage</b>	-10V to +60V, +150V or +200V (Selectable on front panel)
<b>Gain</b>	20 V/V
<b>Signal Bandwidth</b>	>400 kHz (unloaded)
<b>Power Bandwidth</b>	5 kHz (100nF load)
<b>Offset</b>	0V to 200V
<b>Input</b>	Differential, $Z_{in} = 27 \text{ k}\Omega$ (eliminates ground loops and noise)
<b>Connectors</b>	BNC input and output connectors
<b>Load</b>	Unlimited capacitive loads
<b>Overload</b>	Thermal, current and voltage overload protection
<b>Noise</b>	Ultralow noise, < 150 µV RMS (1µF Load)
<b>Environment</b>	0 - 40°C (32-104°F) Non-condensing humidity
<b>Enclosure</b>	Rugged desktop enclosure with no fan or vents. Also mounts into a Eurocard subrack or DIN rail.
<b>Dimensions</b>	226 x 111 x 83mm mm (L x W x L)
<b>Power Supply</b>	115V or 230V AC (selectable)

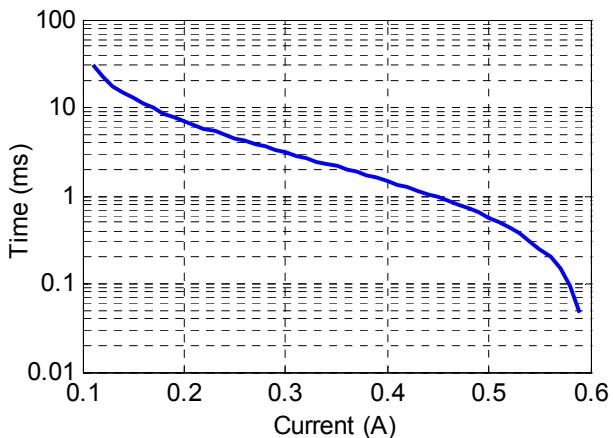


Figure 1. Overload current versus time

### Contact and Support

[info@piezodrive.com](mailto:info@piezodrive.com)

# Performance Specifications

## Power Bandwidth

The power bandwidth of the PDL200 is more than three times greater than a standard amplifier with a static current limit. For signals over 100Hz the maximum frequency sine-wave is approximately,

$$f^{max} = \frac{0.1}{V_{pp}C} \text{ Hz},$$

where  $V_{pp}$  is the peak-to-peak voltage and  $C$  is the load capacitance. Some values are tabulated below.

Load Capacitance	Power Bandwidth
100 nF	5.0 kHz
300 nF	1.66 kHz
1.0 µF	500 Hz
3.0 µF	167 Hz
10 µF	50 Hz
30 µF	6 Hz
100 µF	2 Hz

Table 1. Power bandwidth versus load

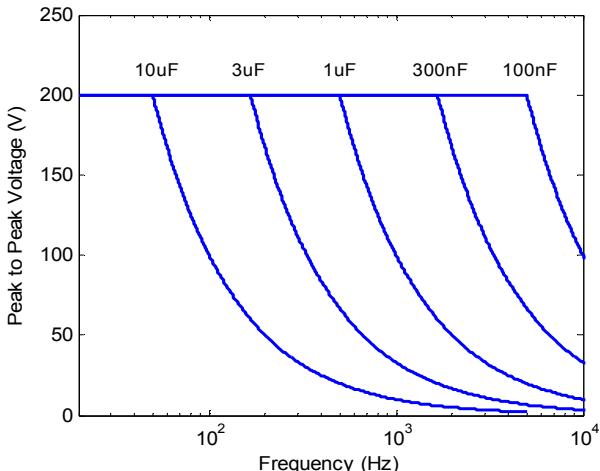


Figure 2. Maximum sine-wave amplitude versus frequency

## Signal Conditioning

The differential input circuit of the PDL200 eliminates ground-loops and noise resulting from the interconnection of different instruments.

## Bias/Offset Voltage

A bias voltage of 0V to 200V can be set from a 10-turn potentiometer on the front panel.

## Voltage Limit

The voltage limit switch restricts the maximum output voltage to either: 60V, 150V or 200V.

## Frequency Response

With a capacitive load, the PDL200 exhibits an approximately first-order response with a bandwidth of

$$f^{3dB} = \frac{1}{150C} \text{ Hz},$$

where  $C$  is the load capacitance. Some typical values of bandwidth are tabulated below.

Load Capacitance	Signal Bandwidth
100 nF	53 kHz
300 nF	18 kHz
1.0 µF	5.3 kHz
3.0 µF	1.8 kHz
10 µF	530 Hz
30 µF	180 Hz
100 µF	53 Hz

Table 2. Signal bandwidth versus load

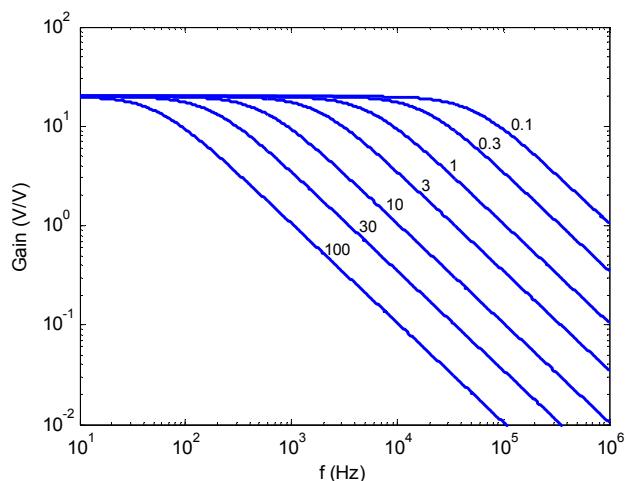


Figure 3. Frequency response versus capacitive load (in  $\mu\text{F}$ )

## Noise Performance

The PDL200 is a low noise amplifier designed to exceed the requirements of positioning and imaging systems with sub-atomic resolution. The following table lists some experimentally measured noise voltages.

Load Cap.	Bandwidth	Noise (RMS)
100 nF	53 kHz	770 $\mu\text{V}$
300 nF	18 kHz	290 $\mu\text{V}$
1.0 µF	5.3 kHz	125 $\mu\text{V}$
3.0 µF	1.8 kHz	95 $\mu\text{V}$
10 µF	530 Hz	57 $\mu\text{V}$
30 µF	180 Hz	42 $\mu\text{V}$
100 µF	53 Hz	27 $\mu\text{V}$

Table 3. Signal bandwidth versus load

## Enclosure

The PDL200 is housed in a compact and rugged aluminium enclosure with no fans or vents. In addition to desktop operation, the PDL200 also mounts into a standard Eurocard subrack or onto an industrial DIN rail.

## Options

The PDL200 can be customized to meet a range of industrial or scientific requirements. Specific options include:

- 1) 19 inch subrack front panel.
- 2) Alternate Connectors e.g. Lemo 00