

# Model PZD2000

## High-Voltage, High-Bandwidth Power Amplifier



The Trek Model PZD2000 is a wide bandwidth high-voltage power amplifier used for precision high power applications. This new addition to the Trek power amplifier product line is designed to provide precise control of output voltages in the range of 0 to  $\pm 2$  kV DC. Features include an output current range of 0 to  $\pm 400$  mA and an impressive large signal bandwidth capability of 60 kHz.

The Model PZD2000 incorporates an all-solid-state design for high reliability and low-noise operation while its four-quadrant output stage sinks as well as sources load current throughout the output voltage range, thus achieving accurate output response and high slew rates, even into highly capacitive loads. The output stage is fully protected against overvoltage and overcurrent conditions that may be generated by active loads, overloads, or arcing to ground.

Precision voltage and current monitors provide buffered low-voltage representations of the high-voltage output and load current for monitoring purposes, or for use as feedback signals in closed-loop systems.

A remote high-voltage ON/OFF feature provides remote operation from automated or computer-controlled systems.

Industrial applications include dielectric material characterization, polymer and ceramic corona poling, and piezoelectric driving and control.

The Model PZD2000 high-voltage, high bandwidth, power amplifier can be operated on a bench top or in a standard 19-inch rack.

**Output Voltage Range:**  
0 to  $\pm 2$  kV DC or peak AC

**Output Current Range:**  
0 to  $\pm 200$  mA DC or  
0 to  $\pm 400$  mA peak AC

**DC Accuracy:**  
Better than 0.1% of  
full scale

**Power Bandwidth:**  
60 kHz

**Slew Rate:**  
Greater than 750 V/ $\mu$ s

**Adjustable current limit  
or current trip**

**Precision voltage  
and current monitors  
provide low-voltage  
representations of the  
output voltage and  
load current**

**Remote high voltage  
ON/OFF feature suitable  
for use with automated  
or computer-controlled  
systems**

**CONTROL WITHOUT COMPROMISE**



# Model PZD2000 Specifications

All specifications are with no load unless otherwise noted.

## Output

### Output Voltage Range

0 to  $\pm 2$  kV DC or peak AC.

### Output Current Range

0 to  $\pm 200$  mA DC or  $\pm 400$  mA peak AC.  
Maximum duration for  $\pm 400$  mA current pulse is 2 ms, at 50% duty cycle using a square wave. (See Automatic Power Limit feature for limitations.)

### Maximum Power

550 W (real, apparent, or reactive). Unit will trip off if the internal power dissipated exceeds 650 W.

## Amplifier Input

### Input Voltage Range

0 to  $\pm 10$  V DC or peak AC.

### Input Impedance

25 k $\Omega$ , nominal.

## Features

### High-Voltage On/Off

Switch selectable for either local or remote control.

#### Local

Individual push-button switches.

#### Remote (Digital Enable)

A TTL compatible input. A TTL high (or open) turns off the high-voltage output. A TTL low turns on the high-voltage output.

### Dynamic Adjustment

A graduated one-turn potentiometer is used to optimize the AC response for various load configurations.

### Current Limit/Trip

Switch selectable for either limit or trip.  
A graduated one-turn potentiometer is used to adjust the limit or trip level from 10 to 400 mA peak.

### Out of Regulation Status

An indicator will illuminate and a BNC will provide a TTL low when the PZD2000 fails to produce the required high-voltage output such as during current limit.

### Trip Status

An indicator will illuminate and a BNC will provide a TTL low when the high-voltage output is tripped off due to:  
a) the output current exceeding the current trip level,  
b) the detection of a high-voltage power supply fault, or  
c) the removal of the top cover.

## Features (cont.)

### Fault Status

A BNC will provide a TTL low when the PZD2000 is Out of Regulation for greater than 500 ms.

### Voltage Monitor

A buffered output provides a low-voltage replica of the high-voltage output.

#### Scale

1/200th of the high-voltage output.

#### DC Accuracy

Better than 0.1% of full scale.

#### Offset Voltage

Less than  $\pm 2$  mV.

#### Output Noise

Less than 2 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

#### Output Impedance

47  $\Omega$ .

### Current Monitor

A buffered output provides a low-voltage representation of the load current.

#### Scale

0.025 V/mA.

#### DC Accuracy

Better than 1% of full scale.

#### Offset Voltage

Less than  $\pm 10$  mV.

#### Output Noise

Less than 10 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

#### Output Impedance

47  $\Omega$ .

## Performance

### DC Voltage Gain

200 V/V.

### DC Voltage Gain Accuracy

Better than 0.1% of full scale.

### Offset Voltage

Less than  $\pm 2$  V.

### Output Noise

Less than 80 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

### Slew Rate (10% to 90%, typical)

Greater than 750 V/ $\mu$ s.

### Large Signal Bandwidth (3% distortion)

DC to greater than 60 kHz.

### Small Signal Bandwidth (-3dB)

DC to greater than 100 kHz.

## Performance (cont.)

### Settling Time to 1%

Less than 50  $\mu$ s for a 2 kV step.

### Stability

Drift with Time

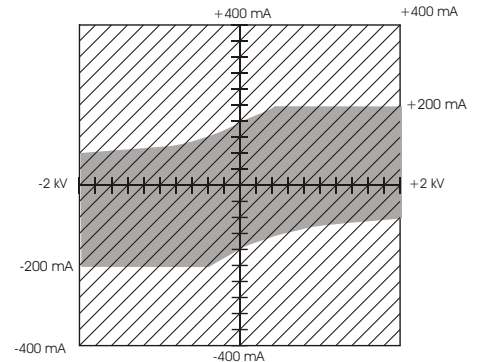
Less than 50 ppm/hr, noncumulative.

Drift with Temperature

Less than 100 ppm/ $^{\circ}$ C.

### Automatic Power Limit

Automatically limits the internal power dissipation to protect the Model PZD2000 from overheating. The following graph illustrates the automatic power limit output capability.



▨ AC Operating Range (frequencies above 50 Hz, 50% duty cycle, and no DC offset)

■ DC Operating Range

## General

### Dimensions

235 mm H x 482 mm W x 597 mm D  
(9.25" H x 19" W x 23.5" D).

### Weight

24.9 kg (55 lb).

### High-Voltage Output Connector

Caton high-voltage connector.

### Amplifier Input, Voltage Monitor

### Current Monitor, Digital Enable,

### Fault/Trip Status,

### Out of Regulation Status

BNC Coaxial Connectors

### AC Line Receptacle

Standard three-prong AC line connector.

### Power Requirements

#### Line Voltage

104 to 126 V AC or 180 to 250 V AC,  
at 48 to 63 Hz (specify when ordering).

#### Power Consumption

1000 VA, maximum.

TREK, INC. certifies that each Model PZD2000 is tested and calibrated to specifications using measurement equipment traceable to the National Institute of Standards and Technology or traceable to consensus standards.

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