

# Model PZD350A Series Piezo Driver/Amplifier Series



The Trek Model PZD350A is a high-voltage DC power amplifier designed to provide precise control of output voltages in the bipolar range of 0 to  $\pm 350$  V and unipolar ranges of 0 to +700 V or 0 to -700 V DC or peak AC.

Output current ratings are  $\pm 200$  mA for the bipolar range or  $\pm 100$  mA for the unipolar ranges. Bipolar or unipolar ranges are customer specified and factory set. The Model PZD350A is configured as a noninverting amplifier with a variable DC gain to 150 V/V. An inverting amplifier configuration is optionally available. Features include an all-solid-state design, a slew rate greater than 550 V/ $\mu$ s ( $\pm 350$  V range) or 350 V/ $\mu$ s (700 V ranges).

"DC to greater than" bandwidth capabilities for the 350 volt range include large signal bandwidth of 250 kHz (-3 dB) and a small signal bandwidth greater than 350 kHz (-3 dB).

Applications for the Model PZD350A include piezoelectric driving/control, laser modulation, semiconductor research, and ion beam control.

A four-quadrant active output stage sinks or sources current into reactive or resistive loads throughout the output voltage range. This capability is essential for achieving the accurate output responses and high slew rates demanded by reactive loads.

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 a closed-loop system. The Digital Enable feature provides a connection for a remote device to turn ON and OFF the high voltage of the instrument.

The Model PZD350A is available in single channel or dual channel instruments and is bench top operable or in a 19-inch rack.

## Superior Bandwidth

- **Bi-Polar Range:**  
0 to  $\pm 350$  V, DC or Peak AC  
 **$\pm 200$  mA Current**  
**Large Signal Bandwidth:**  
DC to Greater than 250 kHz (-3 dB)  
**Small Signal Bandwidth:**  
DC to Greater than 350 kHz (-3 dB)  
**Slew Rate:**  
Greater Than 550 V/ $\mu$ s
- **Uni-Polar Ranges:**  
0 to +700 V DC or Peak AC  
or 0 to -700 V DC or peak  
AC with  $\pm 100$  mA current  
**Large Signal Bandwidth:**  
DC to Greater than 200 kHz (-3 dB)  
**Small Signal Bandwidth:**  
DC to Greater than 250 kHz (-3 dB)  
**Slew Rate:**  
Greater than 440 V/ $\mu$ s
- **Adjustable Gain Ratio:**  
To 150 V / V
- **DC Accuracy:**  
Better Than 0.1% of  
Full Scale with 100 V/V Gain
- **Precision Monitors:**  
Voltage and Current  
Monitors
- **Remote High-Voltage  
ON/OFF**
- **Waveform Dynamic  
Adjustment**



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# Model PZD350A Series Primary Specifications

All specifications are with no load unless otherwise noted.

## Output (User Specified)

Factory set per customer requirement:

### Bipolar Model

0 to  $\pm 350$  V DC or peak AC

#### Current

0 to  $\pm 200$  mA.

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

Greater than 550 V/ $\mu$ s.

#### Large Signal Bandwidth

DC to greater than 250 kHz (-3 dB).

DC to greater than 90 kHz (1% distortion)

#### Small Signal Bandwidth

DC to greater than 350 kHz (-3 dB).

### Unipolar Models

0 to +700 V DC or peak AC or

0 to -700 V DC or peak AC or

#### Current

0 to  $\pm 100$  mA.

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

Greater than 440 V/ $\mu$ s.

#### Large Signal Bandwidth

DC to greater than 200 kHz (-3 dB).

DC to greater than 70 kHz (1% distortion)

#### Small Signal Bandwidth

DC to greater than 250 kHz (-3 dB).

## Amplifier Input

### Input Voltage Range

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

### Input Impedance

90 k $\Omega$ , nominal (noninverting).

1 M $\Omega$ , nominal (inverting).

## Features

The Model PZD350A is available as a one or two channel instrument. The following features are specific to each amplifier channel.

### Digital Enable

A BNC connection for a TTL compatible signal to turn on and off the high-voltage output is provided for each channel. A TTL high (or open) turns off the high-voltage output. A TTL low turns on the high-voltage output.

### Gain Control

The gain of the Model PZD350A is adjustable to 150 V/V.

## Features (cont.)

### Dynamics Adjustment

A graduated potentiometer is used to optimize the AC output for various load parameters.

### Input Configuration

The input is configured as a noninverting amplifier. An inverting amplifier configuration is available.

### Limit Indicator

An amber indicator warns when the Model PZD350A fails to produce the required high-voltage output.

### Voltage Monitor

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

#### Scale Factor

1/100th,  $\pm 0.1\%$  of full scale.

### Current Monitor

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

#### Scale Factor

0.05 V/mA,  $\pm 1\%$  of full scale.

## Performance

### DC Voltage Gain

To 150 V/V, adjustable using front panel potentiometer.

### DC Voltage Gain Accuracy (input to output)

Better than 0.1% for a set gain of 100 V/V.

### Offset Voltage

Less than  $\pm 500$  mV.

### Output Noise (all ranges)

Measured with the true rms feature of the Hewlett Packard Model 34401A digital multimeter.

Less than 100 mV rms to 20 kHz for a 100 pF load.

Less than 150 mV rms to 20 kHz with no load.

### Stability (with a set gain of 100 V/V)

#### Drift with Temperature

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

#### Drift with Time

Less than 50 ppm/hr, noncumulative.

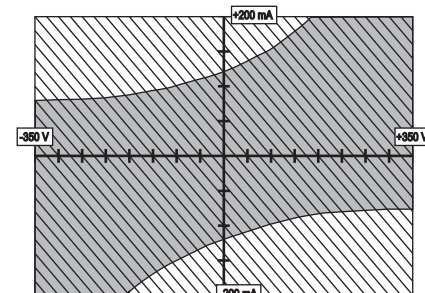
## Performance (cont.)

### Settling Time to 1%

Less than 30  $\mu$ s when critically damped.

### Automatic Power Limit

Automatically limits the internal power dissipation to protect the Model PZD350A from overheating. The following graph illustrates the automatic power limit for the  $\pm 350$  volt range.



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

DC Operating Range

## General

### Dimensions (Single Channel Instrument)

110 mm H x 220 mm W x 445 mm D  
(4.3" H x 8.7" W x 17.5" D).

### Weight (Single Channel Instrument)

5 kg (11 lb).

### High-Voltage Output Connector

SHV high-voltage connector.

### Power Requirements

#### Line Voltage

Factory set for one of two ranges: 90 to 127 V AC or 180 to 250 V AC, at 48 to 63 Hz (specify when ordering).

#### Power Consumption

90 VA, single channel.  
175 VA, dual channel.

### Power Receptacle

Standard three-prong power connector with an integral fuse holder.

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All specifications are subject to change.

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## Model PZD350A Series Ordering Information

Item	Part No.	Included Accessories
Model PZD350A single unit (90 to 127 V AC) . . . . .	PZD350A-1-L	Operator's Manual . . . . . 23432
Model PZD350A dual unit (90 to 127 V AC) . . . . .	PZD350A-2-L	High-Voltage Output Cable Assembly (3 meters) . . . . . 43874
Model PZD350A single unit (180 to 250 V AC) . . . . .	PZD350A-1-H	Line cord (90 to 127 V AC) . . . . . N5002
Model PZD350A dual unit (180 to 250 V AC) . . . . .	PZD350A-2-H	Line Cord (180 to 250 V AC) . . . . . Contact Factory

The Model PZD350A comes from the factory with settings for an output voltage of  $\pm 350$  V DC or peak AC, a voltage gain ratio of 100 V/V, with a noninverting input. Please specify voltage range ( $\pm 350$  V, +700 V, or -700 V) and input configuration (inverting or noninverting) when ordering.

**Also available is the Model PZD350A M/S with twice the current capability of the standard PZD350A**



TREK, INC. • 11601 Maple Ridge Road • Medina, NY 14103 • USA • 800-FOR TREK  
585-798-3140 • 585-798-3106 (fax) • www.trekinc.com • sales@trekinc.com

