

# Model 5/80

## High-Voltage Power Amplifier



The Trek Model 5/80 is a DC-stable, high-voltage power amplifier designed to provide precise control of output voltages in the range of 0 to  $\pm 5$  kV DC or peak AC with an output current range of 0 to  $\pm 80$  mA DC or peak AC. The Model 5/80 is configured as a noninverting amplifier with a fixed gain of 1000 V/V. Industrial and research applications include dielectric material characterization, polymer and ceramic corona charging, and piezoelectric driving and control.

The Model 5/80 features an all solid-state design for high slew rate, wide bandwidth, and low-noise operation. The four-quadrant, active output stage sinks or sources current into reactive or resistive loads throughout the output voltage range. This is essential for achieving the accurate output response and high slew rates demanded by reactive loads.

The Model 5/80 is protected against overvoltage and overcurrent conditions that may be generated by active loads or by output short circuits to ground. Precision voltage and current monitors provide low-voltage replicas of the high-voltage output and load current for monitoring purposes or for use as feedback signals in a closed-loop system.

The Remote High-Voltage On/Off feature provides a connection for a remote device to turn on and off the High-Voltage of the instrument. This makes the Model 5/80 suitable for automated or computer controlled systems.

The Model 5/80 can be operated on a bench top or in a standard 19-inch rack.

- Output voltage range  
0 to  $\pm 5$  kV
- Output current range  
0 to  $\pm 80$  mA
- Slew rate greater than  
1000 V/ $\mu$ s
- DC voltage gain  
accuracy 0.1% of  
full scale
- Remote high-voltage  
ON/OFF capability
- Output monitors  
provide low-voltage  
representations of  
output voltage  
and current
- Adjustable current  
limit or current trip
- Dynamic adjustment  
optimizes output  
voltage waveform
- $\text{CE}$  compliant



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# Model 5/80 Specifications

All specifications are with no load unless otherwise noted.

## Output

### Output Voltage Range

0 to  $\pm 5$  kV DC or peak AC.

### Output Current Range

0 to  $\pm 80$  mA DC or peak AC.

(See Automatic Power Limit feature for limitations.)

## Amplifier Input

### Input Voltage Range

0 to  $\pm 5$  V DC or peak AC.

### Input Impedance

10 k $\Omega$ , nominal.

## Features

### High-Voltage On/Off

Switch selectable for either local or remote control.

#### Local

Individual push-button switches.

#### Remote

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 panel potentiometer is used to optimize the AC response of the Model 5/80 for various load parameters.

### Current Limit/Trip

Switch selectable for either limit or trip. A graduated one-turn panel potentiometer is used to adjust the limit or trip level from 0 to  $\pm 80$  mA.

### Out of Regulation Status

An indicator will illuminate and a BNC will provide a TTL low when the Model 5/80 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 disabled due to the output current exceeding the current trip level, the detection of a high-voltage supply fault, or the removal of the top cover.

### Fault Status

A BNC will provide a TTL low when the Model 5/80 is out of regulation for greater than 500 ms.

## Features (cont.)

### Voltage Monitor

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

#### Scale Factor

1/1000th of the high-voltage output signal.

#### DC Accuracy

Better than 0.1% of full scale.

#### Offset Voltage

Less than  $\pm 2$  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  $\Omega$ .

### Current Monitor

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

#### Scale Factor

0.1 V/mA.

#### DC Accuracy

Better than 1 % of full scale.

#### Offset Voltage

Less than  $\pm 10$  mV.

#### Output Noise

Less than 30 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

#### Bandwidth (-3db)

DC to greater than 10 kHz.

#### Output Impedance

47  $\Omega$ .

## Performance

### DC Voltage Gain

1000 V/V.

### DC Voltage Gain Accuracy

Better than 0.1% of full scale.

### Offset Voltage

Less than  $\pm 2$  V.

### Output Noise

Less than 1.0 V rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

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

Greater than 1000 V/ $\mu$ s.

### Large Signal Bandwidth (-3dB)

DC to greater than 60 kHz.

### Large Signal Bandwidth (1% distortion)

DC to greater than 50 kHz.

### Small Signal Bandwidth (-3dB)

DC to greater than 75 kHz.

## Performance (cont.)

### Settling Time (to 1%)

Less than 50  $\mu$ s for a 0 to 5 kV step.

### Stability

#### Drift with Time

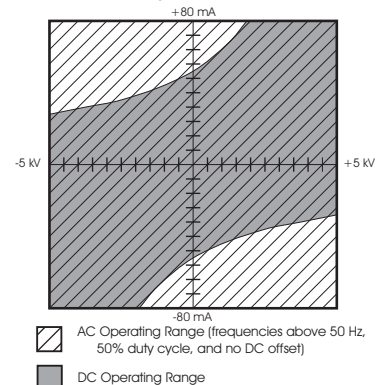
Less than 50 ppm/hr, noncumulative.

#### Drift with Temperature

Less than 200 ppm/ $^{\circ}$ C.

### Automatic Power Limit

Automatically limits the internal power dissipation to protect the Model 5/80 from overheating. The following graph illustrates the automatic power limit output capability.



## General

### Dimensions

279 mm H x 482 mm W x 654 mm D  
(11" H x 19" W x 25.75" D).

### Weight

24.9 kg (55 lb).

### High-Voltage Output Connector

Alden high-voltage connector.

### BNC Connectors

Amplifier Input  
Voltage Monitor  
Current Monitor  
Remote High-Voltage On/Off  
Out of Regulation Status  
Fault/Trip Status connector

### Power Requirements

#### Line Voltage

Factory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC, at 48 to 63 Hz (specify when ordering).

#### Power Consumption

1000 VA, maximum.

### AC Line Receptacle

Standard three-prong AC line connector.

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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

