

Model 10/10B-HS

High-Voltage Power Amplifier



The Trek Model 10/10B-HS is a DC stable high-voltage power amplifier capable of precise control of output voltages in the range of 0 to ± 10 kV DC or peak AC with an output current range of 0 to ± 10 mA DC or 40 mA peak AC for 1 ms. The Model 10/10B-HS is configured as a noninverting amplifier with a fixed gain of 1000 V/V.

Industrial and R&D applications include AC or DC biasing, atmospheric plasma, dielectric barrier discharge, electroactive polymers (EAP), electrophoresis, electrophotography, electrorheological fluids, electrostatic deflection, electro-optic modulation, ferroelectric material characterization, ion beam steering, mass spectrometers, material poling and particle accelerators.

The Model 10/10B-HS 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 10/10B-HS is protected against over-voltage and over-current conditions that may be generated by active loads or by output short circuits to ground.

Precision voltage and current monitors provide 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 remote high voltage on/off feature provides a connection for a remote device to turn on and off the high-voltage output. This makes the Model 10/10B-HS suitable for automated or computer-controlled systems. The Model 10/10B-HS can be operated on a bench top or in a standard 19-inch rack.

- Output Voltage Range
0 to ± 10 kV
- Output Current Range
0 to ± 10 mA DC, with
a 40 mA peak for 1 ms
- Slew rate greater than
700 V/ μ s
- Dynamic Adjustment
for optimizing
AC response
- Remote high-voltage
ON/OFF capability
- Adjustable current
limit or current trip
- Precision Voltage and
Current Monitors
Provide Low-Voltage
Representations of
the 10/10B-HS Output
- CE Compliant



Measurement and Power Solutions™

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Model 10/10B-HS Specifications

All specifications are with no load unless otherwise noted.

Output

Output Voltage Range

0 to ± 10 kV DC or peak AC.

Output Current Range

0 to ± 10 mA DC or
 ± 40 mA peak for 1 ms.
(See Automatic Power Limit feature for limitations.)

Amplifier Input

Input Voltage Range

0 to ± 10 V DC or peak AC.

Input Impedance

20 k Ω , 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 10/10B-HS 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 ± 10 mA.

Out of Regulation Status Indicator and Connector

An indicator will illuminate and a BNC will provide a TTL low when the Model 10/10B-HS fails to produce the required high-voltage output such as during current limit.

Fault/Trip Status Indicator and Connector

An indicator will illuminate and a BNC will provide a TTL low when the high-voltage is disabled due to the set current trip level being exceeded or the internal interlock circuit being interrupted, such as by removal of the cover. This BNC connector will also provide a TTL low when the amplifier is out of regulation for more than 500 ms, such as during a current limit. However, in this instance the high-voltage output is not disabled.

Voltage Monitor

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

Features (cont.)

Scale Factor

1 V/1000 V.

DC Accuracy

Better than 0.1% of full scale.

Offset Voltage

Less than ± 3 mV.

Output Noise

Less than 20 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

Output Impedance

47 Ω .

Current Monitor

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

Scale Factor

1 V/4 mA.

DC Accuracy

Better than 1 % of full scale.

Offset Voltage

Less than ± 10 mV.

Output Noise

Less than 50 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 Ω .

Performance

DC Voltage Gain

1000 V/V.

DC Voltage Gain Accuracy

Better than 0.1% of full scale.

Offset Voltage

Less than ± 2 V.

Output Noise

Less than 0.5 V rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

Slew Rate (10% to 90%, typical)

Greater than 700 V/ μ s.

Large Signal Bandwidth(-3dB)

DC to greater than 19.5 kHz.

Large Signal Bandwidth(1% distortion)

DC to greater than 9.5 kHz.

Small Signal Bandwidth (-3dB)

DC to greater than 60 kHz.

Settling Time (to 1%)

Less than 100 μ s for a 0 to 10 kV step.

Stability

Drift with Time

Less than 100 ppm/hr, noncumulative.

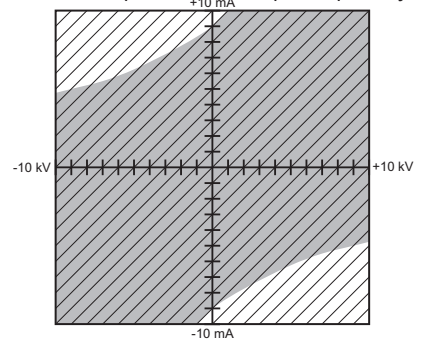
Drift with Temperature

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

Performance (cont.)

Automatic Power Limit

Automatically limits the internal power dissipation to protect the Model 10/10B-HS 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

190 mm H x 432 mm W x 417 mm D
(7.5" H x 17" W x 16.4" D).

Weight

14.9 kg (31 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: 90 to 127 V AC or 180 to 250 V AC, at 48 to 63 Hz (specify when ordering).

Power Consumption

680 VA, maximum.

AC Line Receptacle

Standard three-prong AC line connector with integral fuse holder.

Included Accessories

Operator's Manual, HV Output Cable, Line Cord (90 to 127V AC operation), Unterminated Line Cord* (180 to 250V AC operation). *Line cord type determined by the geographical destination of the unit.

Optional Accessories

HV Output Cable in varying lengths, 19-in Rack Mount Kit(s)

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