

Trek Model 40/15

High-Voltage Power Amplifier

The Model 40/15 is a DC-stable, high-voltage power amplifier featuring an all solid-state design for high slew rate, wide bandwidth, and low-noise operation. It is configured as noninverting with a fixed gain of 4000 V/V and 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 representations of the high-voltage output and load current for monitoring purposes or for use as feedback signals in a closed-loop system.

The 4-quadrant, active output stage sinks or sources current to reactive or resistive loads throughout the output voltage range. This is essential to achieve the accurate output response and high slew rates demanded by reactive loads.

Key Specifications

- Output Voltage Range: 0 to ± 40 kV DC or peak AC
- Output Current Range: 0 to ± 15 mA DC or peak AC
- Slew Rate: Greater than 350 V/ μ s
- Large Signal Bandwidth: DC to greater than 1.4 kHz (2% Distortion)
- DC Voltage Gain: Fixed at 4000 V/V

Typical Applications Include

- Dielectric studies
- Electron beam ion traps and ion sourcing
- Electrospinning
- Electrostatic deflection (including ion beam steering)
- Electrostatic flame control
- Electrostatic levitation
- Electrostatic precipitation
- High-voltage cable testing
- High-voltage component testing
- Plasma studies (including dielectric barrier discharge)

Features and Benefits

- Four-quadrant output for driving capacitive loads
- Closed loop system for high accuracy
- Short-circuit protected for equipment protection
- All solid-state design for maintenance free operation
- DC-stable for programmable supply applications
- Low output noise for ultra-accurate outputs
- NIST-traceable Certificate of Calibration provided with each unit



Model 40/15 Specifications

Performance

Output Voltage Range	0 to ± 40 kV DC or peak AC
Output Current Range	0 to ± 15 mA DC or peak AC
Input Voltage Range	0 to ± 10 V DC or peak AC
Input Impedance	25 k Ω , nominal (inverting/differential option 50 k Ω nominal)
DC Voltage Gain	4000 V/V
DC Voltage Gain Accuracy	Better than 0.1% of full scale
Offset Voltage	Less than ± 4 V
Output Noise	Less than 5 V rms*
Slew Rate (10% to 90%, typical)	Greater than 350 V/ μ s
Small Signal Bandwidth (-3dB)	DC to greater than 20 kHz
Large Signal Bandwidth (2% distortion)	DC to greater than 1.4 kHz
Stability	
<i>Drift with Time</i>	Less than 50 ppm/hr, noncumulative
<i>Drift with Temperature</i>	Less than 100 ppm/ $^{\circ}$ C

Voltage Monitor

Ratio	1 V / 4000 V
DC Accuracy	Better than 0.1% of full scale
DC Offset Voltage	Less than ± 2 mV
Output Noise	Less than 20 mV rms*
Output Impedance	47 Ω

Current Monitor

Ratio	0.5 V/mA
DC Accuracy	Better than 2% of full scale
Offset Voltage	Less than ± 10 mV
Output Noise	Less than 30 mV rms*
Bandwidth (-3dB)	DC to greater than 5 kHz
Output Impedance	47 Ω

*Measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter

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Features

High-Voltage On/Off	
<i>Local</i>	Individual push-button switches
<i>Remote</i>	TTL compatible input. TTL high (or open) turns off high-voltage output. TTL low turns on high-voltage output.
Dynamic Adjustment	Graduated 1-turn panel potentiometer is used to optimize the AC response for various load parameters.
Current Limit/Trip	Switch selectable for limit or trip. Graduated 1-turn panel potentiometer is used to adjust limit or trip level from 0 to ± 15 mA.
Out of Regulation Status Indicator and Connector	Illuminates and TTL low is provided when unit fails to produce required HV output such as during current limit.
Limit/Trip Status Indicator and Connector	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 power supply fault, removal of one of the panels, or if the Model 40/15 is in an out of regulation status for greater than 500 ms.

Mechanical

Dimensions	1239 mm H x 578 mm W 893 mm D (49" H x 22.8" W x 35" D)
Weight	100 kg (220 lb)
HV Connector	Caton High Voltage Connector
BNC Connectors	Amplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip Status

Operating Conditions

Temperature	0 $^{\circ}$ C to 40 $^{\circ}$ C (32 $^{\circ}$ F to 104 $^{\circ}$ F)
Relative Humidity	To 75%, noncondensing
Altitude	To 1524 meters (5000 ft.)

Electrical

Line Voltage	180 to 250 V AC at 48 to 63 Hz
Power Consumption	1800 VA, maximum
AC Line Receptacle	Standard 3-prong with integral fuse holder

Supplied Accessories

Operators Manual	PN: 23392
Shorting BNC Cap	PN: B3060
HV Output Cable	PN: 43466
Line Cord, Fuses	Selected per geographic destination