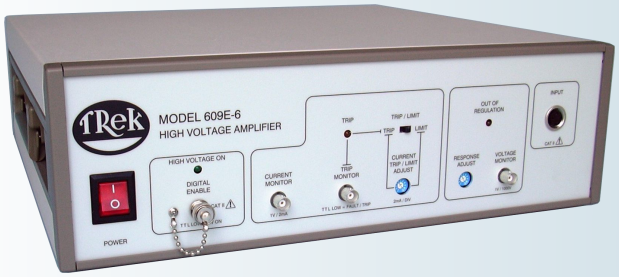
Trek Model 609E-6

High-Voltage Power Amplifier



The Model 609E-6 is a DC-stable, high-voltage power amplifier used in industrial and research applications. It 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 type of output is essential to achieve an accurate output response and high slew rate demanded by a variety of loads such as highly capacitive or reactive loads. It is configured as a non-inverting amplifier, an inverting amplifier or as a differential amplifier. Different input configurations can be wired into the unit.

Key Specifications

- Output Voltage Range: 0 to ±4 kV DC or peak AC
- Output Current Range: 0 to ±20 mA DC or peak AC
- Slew Rate: Greater than 150 V/µs
- Large Signal Bandwidth (-3 dB): DC to greater than 13 kHz
- DC Voltage Gain: 1000 V/V

Typical 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

Features and Benefits

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

High Voltage Products. High Voltage Experts.

Model 609E-6 Specifications

Performance

Output Voltage	0 to ±4 kV DC or peak AC
Output Current	0 to ±20 mA DC or peak AC
Input Voltage Range	0 to ±4 V DC or peak AC
Input Impedance	
Noninverting	25 kΩ, nominal
Inverting	50 kΩ, nominal
Differential	50 kΩ, nominal
DC Voltage Gain	1000 V/V
Noninverting (V_A) Configuration	1000 V/V
Inverting (V_B) Configuration	-1000 V/V
Differential Configuration	Function of the difference between two input signals. Represented by the equation: $V_{OUT} = 1000 (V_A - V_B)$
DC Voltage Gain Accuracy	Better than 0.1% of full scale
DC Offset Voltage	Less than ±2 V
Output Noise	Less than 50 mV rms*
Slew Rate (10% to 90%, typical)	Greater than 150 V/µs
Settling Time (to 1%)	Less than 150 µs for a 0-4 kV step
Large Signal Bandwidth	DC to greater 6 kHz (1% Distortion) DC to greater 13 kHz (-3 dB)
Small Signal Bandwidth (-3dB)	DC to greater than 35 kHz
Stability	
Drift with Time	Less than 100 ppm/hr, noncumulative
Drift with Temp	Less than 200 ppm/°C

Voltage Monitor

Ratio	1/1000th of the high-voltage output signal
DC Accuracy	Better than 0.1% of full scale
DC Offset Voltage	Less than ±2.5 mV
Output Noise	Less than 2 mV rms*
Output Impedance	47 Ω

Current Monitor

Ratio	0.5 V/mA
DC Accuracy	Better than 0.5% of full scale
Offset Voltage	Less than ±5 mV
Output Noise	Less than 10 mV*
Output Impedance	47 Ω

Features

High Voltage On/Off	
Local	Individual push-button switches
Remote	TTL high turns OFF the high voltage; TTL low turns on the high voltage
Dynamics Adjustments	Graduated 1-turn potentiometer used to optimize the AC response for various load parameters
Current Limit/Trip	Switch selectable for limit or trip. Graduated 1-turn potentiometer adjusts from 0 to 20 mA
Out of Regulation	LED illuminates and BNC provides a TTL low when Model 609E-6 fails to produce HV output such as during a current limit
Trip Status	LED illuminates and BNC provides a TTL low when HV is disabled due to the output current exceeding the current trip level, a high voltage fault is detected or the top cover is removed

Mechanical

Dimensions	140 mm H x 432 mm W x 439 mm D (5.5” H x 17” W x 17.25” D)
Weight	13.2 kg (29 lb)
HV Connector	Alden High Voltage Connector
BNC Connectors	Voltage monitor, current monitor, remote HV ON/OFF, out of regulation, fault/trip status
Amplifier Input	Amphenol panel mount

Operating Conditions

Temperature	0°C to 40°C (32°F to 104°F)
Relative Humidity	To 85%, noncondensing
Altitude	To 2000 meters (6561.68 ft.)

Electrical

Line Voltage	Factory Set for one of two ranges: 90 to 127 V AC or 180 to 250 V AC, either at 48 to 63 Hz
Power Consumption	220 VA, maximum

Supplied Accessories

Operator’s Manual	PN: 23163
HV Output Cable	PN: 43406
Input Cable Connector Assembly	PN: 43418
Line Cord (90 V to 127 V operation)	PN: N5011
Line Cord 230 V AC	Contact factory

Optional Accessories

HV Output Cable	PN: 43406
19” Rack Mount Kit	Model 607RA (with EIA hole spacing) Model 607RAJ (with JIS hole spacing)

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

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