

Trek Model 20/20C-HS

High-Speed High-Voltage Power Amplifier



The Model 20/20C-HS is a DC-stable, high-speed, 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.

Key Specifications

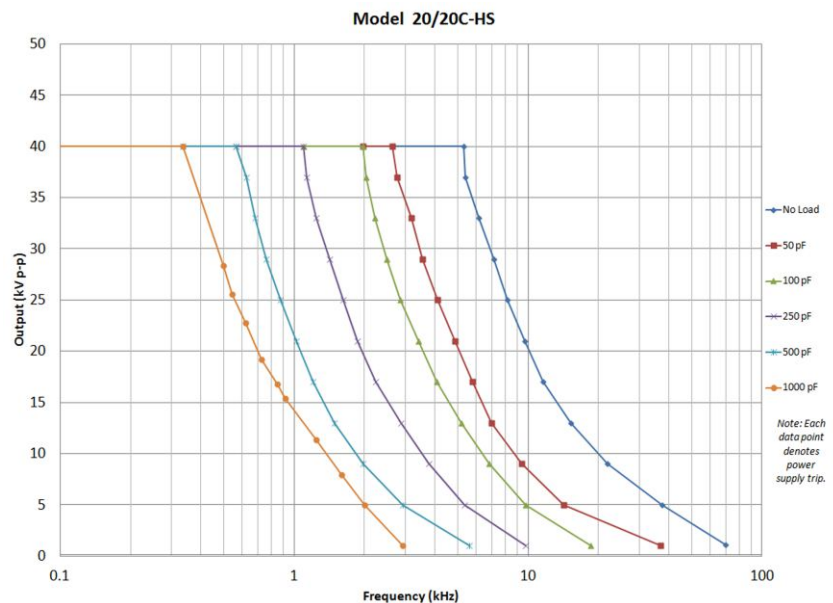
- Output Voltage Range: 0 to ± 20 kV DC or peak AC
- Output Current Range: 0 to ± 20 mA DC or 60 mA peak AC for 1 ms (must not exceed 20 mA rms)
- Slew Rate: Greater than 800 V/ μ s
- Large Signal Bandwidth (1% Distortion): DC to greater than 5.2 kHz
- DC Voltage Gain: Fixed at 2000 V/V

Typical Applications Include

- Electrostatic deflection
- Electrophoresis
- Electrorheological fluids
- Electro-optic modulation
- Material poling
- AC or DC biasing
- Ion beam steering
- Particle accelerators
- Mass spectrometers
- Material characterization
- Ferroelectrics
- Atmospheric plasma
- 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



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Model 20/20C-HS Specifications

Performance

Output Voltage Range	0 to ± 20 kV DC or peak AC
Output Current Range	0 to ± 20 mA DC or ± 60 mA peak for 1 ms (must not exceed 20 mA rms)
Input Voltage Range	0 to ± 10 V DC or peak AC
Input Impedance	25 k Ω , nominal
DC Voltage Gain	2000 V/V
DC Voltage Gain Accuracy	Better than 0.1% of full scale
DC Offset Voltage	Better than ± 2 V
Output Noise	Less than 1.5 V rms*
Slew Rate (10% to 90%, typical)	Greater than 800 V/ μ s
Large Signal Bandwidth (1% distortion)	DC to greater than 5.2 kHz (The unit will trip when maximum is reached)
Small Signal Bandwidth (-3dB)	DC to greater than 20 kHz
Stability	
Drift with Time	Less than 50 ppm/hr, noncumulative
Drift with Temp	Less than 100 ppm/ $^{\circ}$ C

Voltage Monitor

Ratio	1/2000th of the high-voltage output
DC Accuracy	Better than 0.1% of full scale
DC Offset Voltage	Less than ± 2 mV
Output Noise	Less than 10 mV rms*
Output Impedance	47 Ω

Current Monitor

Ratio	1 V/6 mA
DC Accuracy	Better than 1% of full scale
Offset Voltage	Better than ± 10 mV
Output Noise	Less than 30 mV rms*
Bandwidth (-3dB)	DC to greater than 20 kHz
Output Impedance	47 Ω

Features

High-Voltage On/Off	
Local	Individual push-button switch
Remote	TTL compatible input. TTL high (or open) turns off high-voltage output. TTL low turns on high-voltage output.

Features (cont.)

Dynamic Adjustment	Graduated 1-turn potentiometer is used to optimize the AC response for various load parameters
Limit/Trip Mode	Switch selectable for either limit or trip. Graduated 1-turn potentiometer is used to adjust limit or trip level from 0 to 100% peak current. There is one LED indicator and one BNC connector
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 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 20/20C-HS is out of regulation for greater than 500 ms.
Out of Regulation Status	Illuminates and a TTL low is provided when unit fails to produce required HV output such as during a current limit

Mechanical

Dimensions	279 mm H x 482 mm W 654 mm D (11" H x 19" W x 25.75" D)
Weight	24.9 kg (55 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 85%, noncondensing
Altitude	To 2000 meters (6561.68 ft.)

Electrical

Line Voltage	Factory Set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC, either at 48 to 63 Hz
AC Line Receptacle	Standard IEC 320 three-prong AC line connector
Power Consumption	1000 VA, maximum

Supplied Accessories

Operators' Manual	PN: 23461
HV Output Cable	PN: 43466
Line Cord, Spare Fuses	PN: N5011. Selected per geographic destination

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

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