

Model 20/20C

High-Voltage Power Amplifier



The Model 20/20C is a DC-stable, high-voltage power amplifier used in industrial and research applications such as electrostatic deflection, electrophoresis research, dielectric studies, and accelerated life-testing of high tension cables for power transmission. The Model 20/20C provides precise control of output voltages in the range of 0 to ± 20 kV DC or peak AC with an output current range of 0 to ± 20 mA DC or peak AC. The unit is configured as a noninverting amplifier with a fixed gain of 2000 V/V.

The Model 20/20C 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.

The Model 20/20C is protected against over-voltage and over-current conditions that may be generated by active loads or by output short circuits to ground. This protection includes a user selected TRIP OFF or CURRENT LIMIT value which can be adjusted to a desired level by using a front panel potentiometer. 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. It can be operated on a bench or in a 19 inch rack.

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 20/20C suitable for automated or computer controlled systems.

- Output Voltage Range
0 to ± 20 kV
- Output Current Range
0 to ± 20 mA DC
- Slew Rate Greater
Than 450 V/ μ s
- Dynamics Adjust 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
20/20C Output
- 230 V AC Unit is
CE Compliant



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Model 20/20C Specifications

All specifications are with no load unless otherwise noted.

Output

Output Voltage Range

0 to ± 20 kV DC or peak AC.

Output Current Range

0 to ± 20 mA DC or peak AC.

(See Automatic Power Limit feature for limitations.)

Amplifier Input

Input Voltage Range

0 to ± 10 V DC or peak AC.

Input Impedance

25 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 20/20C 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 ± 20 mA.

Out of Regulation Status

An indicator will illuminate and a BNC will provide a TTL low when the Model 20/20C fails to produce the required high-voltage output such as during current limit or short circuit load conditions.

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 20/20C 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

1/2000th of the high-voltage output signal.

DC Accuracy

Better than 0.1% of full scale.

Offset Voltage

Less than ± 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 Ω .

Current Monitor

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

Scale Factor

0.5 V/mA.

DC Accuracy

Better than 1 % of full scale.

Offset Voltage

Less than ± 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 Ω .

Performance

DC Voltage Gain

2000 V/V.

DC Voltage Gain Accuracy

Better than 0.1% of full scale.

Offset Voltage

Less than ± 2 V.

Output Noise

Less than 1.5 V rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

Slew Rate (10% to 90%, typical)

Greater than 450 V/ μ s.

Large Signal Bandwidth (-3dB)

DC to greater than 7.5 kHz.

Large Signal Bandwidth (1% distortion)

DC to greater than 3.75 kHz.

Small Signal Bandwidth (-3dB)

DC to greater than 20 kHz.

Performance (cont.)

Settling Time (to 1%)

Less than 150 μ s for a 0 to 20 kV step.

Stability

Drift with Time

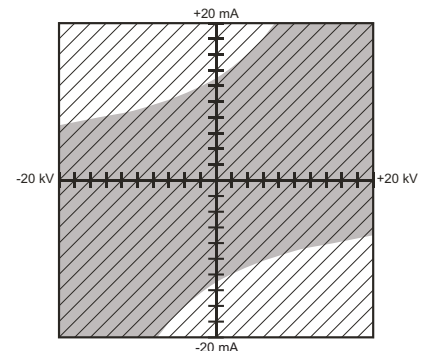
Less than 50 ppm/hr, noncumulative.

Drift with Temperature

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

Automatic Power Limit

Automatically limits the internal power dissipation to protect the Model 20/20C 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

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

Caton 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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