

Model 10/10B-FG

High-Voltage Function Generator



The Model 10/10B-FG High-Voltage Function Generator is a combination of a DC-stable, high-voltage amplifier and a function generator. The high power amplifier is designed to provide 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 peak AC. In the amplifier mode, the 10/10B-FG is configured as a noninverting amplifier with a fixed gain of 1000 V/V. 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 function generator is capable of generating square, triangle, and sine waveforms in the frequency range of 0.2 Hz to 10 kHz.

The Model 10/10B-FG features an all-solid-state design for high slew rate, wide bandwidth, and low-noise operation.

The Model 10/10B-FG 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 replicas 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 of the instrument. This makes the 10/10B-FG suitable for automated or computer controlled systems. Industrial and research applications for the Model 10/10B-FG include electrophoresis, electrophotography-AC and DC biasing, electrostatic deflection, electrooptic modulation, and utilization as a general purpose high-voltage function generator. The 10/10B-FG can be operated on a bench top or, with optional hardware, in a standard 19-inch rack.

Square, Triangle, and Sine Waveforms in the ranges of 0.2 Hz to 10 kHz

Dynamics Adjust optimizes output voltage waveform

Output Voltage range 0 to ± 10 kV

Output Current range 0 to ± 10 mA

Slew Rate greater than 250 V/ μ s

DC Voltage Gain accuracy 0.1% of full scale

Remote High-Voltage ON/OFF capability

Adjustable Current Limit or Current Trip

Voltage Monitor and Current Monitor

CONTROL WITHOUT COMPROMISE



Model 10/10B-FG Primary Specifications

All specifications are with no load unless otherwise noted.

Amplifier Mode

Output Voltage Range

0 to ± 10 kV DC or peak AC.

Output Current Range

0 to ± 10 mA DC or peak AC.

(See Automatic Power Limit feature.)

DC Voltage Gain

1000 V/V.

DC Voltage Gain Accuracy

Better than 0.1% of full scale.

Slew Rate (10% to 90%, typical)

Greater than 250 V/ μ s.

Large Signal Bandwidth (1% distortion)

DC to greater than 4 kHz.

Small Signal Bandwidth (-3dB)

DC to greater than 20 kHz.

Settling Time (to 1%)

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

Offset Voltage

Better than ± 2 V.

Output Noise

Less than 3.5 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter). Detailed information concerning the output noise is available upon request.

Input Voltage Range

0 to ± 10 V DC or peak AC.

Input Impedance

20 k Ω , nominal.

Generator Mode

Function Generator

Able to select among Sine, Square, or Triangle output waveforms.

Output Voltage Range

0 to ± 10 kV DC or peak AC.

Output Current Range

0 to ± 10 mA DC or peak AC.

(Automatic Power Limit feature will limit current to prevent the 10/10B-FG from overheating. Contact TREK, INC. for detailed information.)

Frequency Range

0.2 Hz to 10 kHz.

Frequency Accuracy

$\pm 5\%$ of full scale.

Generator Mode (cont.)

Square Wave Symmetry

Better than 3% at 100 Hz.

Square Wave Rise and Fall Rate

Greater than ± 250 V/ μ s.

Range Select

Push button selects designated frequency spectrum among: 0.2 Hz to 2.0 Hz, 2 Hz to 20 Hz, 20 Hz to 200 Hz, 0.2 kHz to 2.0 kHz, and 2 kHz to 20 kHz. (A 100 kHz range is provided to produce output frequencies up to 20 kHz at reduced amplitude due to slew rate and bandwidth limitations of the amplifier.)

Frequency Dial

Adjusts the frequency within the selected range.

Duty Cycle

This dial determines the time interval and symmetry of the output waveform.

DC Offset

This dial controls the amount of DC bias voltage added to the output voltage waveform.

Attenuator Switch

Switch selectable to 0 dB or -20 dB (attenuation) of the output waveform.

Invert

Inverts the output waveform. The DUTY control determines which portion of the waveform is affected.

Features

Mode Select Switch

Selects between the external Amplifier input and the internal Function Generator mode of operation.

Dynamic Adjustment

A graduated one-turn potentiometer used to optimize the AC response of the 10/10B-FG under various load configurations.

High-Voltage On/Off

Switch selectable for either local or remote control.

Local

Individual push button.

Remote (Digital Enable)

A TTL compatible input. A TTL high (or open) turns off the high-voltage output. A TTL low turns on the high-voltage output.

Current Limit/Trip

Switch selectable for either limit or trip. A graduated one-turn potentiometer is used to adjust the limit or trip level from 0 to 10 mA.

Features (cont.)

Out Of Regulation Status

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

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 or removal of the top cover.

Fault Status

A BNC will provide a TTL low when the 10/10B-FG is Out of Regulation for greater than 500 ms.

Voltage Monitor

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

Scale

1/1000th of the high-voltage output signal.

DC Accuracy

Better than 0.1% of full scale.

Output Impedance

47 Ω .

Current Monitor

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

Scale

1 V/mA.

DC Accuracy

Better than 1% of full scale.

Output Impedance

47 Ω .

Automatic Power Limit

Automatic Power Limit feature will limit current to prevent the 10/10B-FG from overheating. Contact TREK, INC. for detailed information.

General

Stability

Drift with Time

Less than 100 ppm/hr, noncumulative.

Drift with Temperature

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

Dimensions

237 mm H x 432 mm W x 432 mm D
(9.3" H x 17" W x 17" D).

Weight

18 kg (39 lb).

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).

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