



MODEL 560H

DC DIFFERENTIAL AMPLIFIER

- Bandwidth dc to 200 kHz
- Optional selectable 5-step filter
- 100 to 1 Input Divider
- Gains from 0.01 to 2500
- 16 Channels per 5¼" rack mount
- LED indicators for zero offset



Model R513-16 with Model 560HLs

The Model 560H DC Differential Amplifier provides amplification and buffering for low and high-level signal sources. The Model 560H is directly interchangeable with the Model 563H Transducer-Conditioning Amplifier and utilizes the same enclosures. Gain is front-panel selectable from 0.01 to 25 or 1 to 2500 in 10 calibrated gain steps in a 1, 2, 5 sequence plus a $\times 2.5$ gain vernier. Selection of gain range is by a 100:1 input-divider switch. Front-panel controls include both RTI and RTO zero with the RTO-zero range board-mounted switch selectable at $\pm 10V$, $\pm 1V$, or $\pm 100mV$. Amplifier-output-monitor jacks are also provided. Plus and minus front-panel LEDs indicate null condition and offset polarity.

The amplifier bandwidth is dc to 200 kHz, and an optional two-pole Bessel filter with front-panel-selectable frequency cutoffs of 10 Hz, 100 Hz, 1 kHz, 10 kHz, and a wideband option permit user selection of lower bandwidth.

The standard output is $\pm 10 V$ at 10 mA with optional capability to 100 mA. Dual output is provided with the filter option.

The low-noise, low-drift amplifier features input impedance of 50 M Ω and common-mode rejection of 110 dB with up to 10 V or 300 V common-mode-voltage capability.

The Model 560H was designed to accurately process low-level signals in electrically noisy environments by providing excellent common-mode, normal-mode, and RFI/EMI noise rejection.

Available enclosures include a sixteen-unit standard 19-inch rack mount, a six-unit portable bench mount, and a two-unit portable bench mount.



Model E513-6A with Model 560HLs

The Model R513-16 Rack Mount Enclosure provides local and remote control of shunt CAL and zero check of all amplifiers simultaneously. The 120/240V ac power supply and all input/output wiring to rear-panel connectors with mates are also included (dc-powered units are available - Model R513-12V-16 and Model R513-28V-16).

The Model E513-6A six-unit portable enclosure is also equipped with 120/240V ac power supply and all input/output wiring to rear-panel connectors with mates.

The Model E513-2A two-unit portable enclosure comes with 120/240V ac power supply and a barrier strip for all inputs and outputs.

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DC DIFFERENTIAL AMPLIFIER



INPUT CHARACTERISTICS

Configuration: Differential, direct coupled. May be used inverting, noninverting or single-ended.

Input Impedance: 50 M Ω in parallel with 300 pF max. 1 M Ω in divided-input mode.

Common-mode Voltage: ± 10 V dc or peak ac, operating. ± 300 V dc or peak ac in divided-input mode.

Common-mode Rejection: 50 dB + gain in dB, dc to 60 Hz with 350 Ω unbalance.

Maximum Input Overload: ± 20 V dc or peak ac. ± 300 V in divided-input mode.

Source Current: ± 2 nA/200 hours ± 0.5 nA/ $^{\circ}$ C.

Zero Stability: ± 4 μ V RTI ± 0.35 mV RTO for 200 hours.

Zero Temperature Coefficient: ± 1 μ V/ $^{\circ}$ C RTI ± 0.35 mV/ $^{\circ}$ C RTO.

RTI Zero Range: $> \pm 350$ μ V with a 20-turn potentiometer.

DYNAMIC RESPONSE

Bandwidth (within 3 dB):

Small Signal, 1 V rms:	dc to > 200 kHz.
Full Signal, 20 V p-p:	Gain $< \times 1$: dc to > 100 kHz.
	Gain $\times 1$: dc to > 20 kHz.
	Gain $\times 2$: dc to > 50 kHz.
	Gain $\times 5$: dc to > 100 kHz.
	Gain $\times 10$ to $\times 1000$: dc to > 125 kHz.

Slew Rate: Gain of 1, > 1.2 V/ μ s; Gain of 2, > 2.4 V/ μ s; Gains of 5 to 1000, > 6.3 V/ μ s.

Settling Time: 15 μ s to 0.1% of final value.

Overload Recovery: 50 μ s to within $\pm 0.1\%$ of final value from 500% overload.

Noise (0.1 Hz to 200 kHz): 4 μ V RTI + 0.5 mV RTO rms.

(0.1 Hz to 10 Hz): 0.75 μ V RTI + 0.1 mV RTO peak.

OUTPUT CHARACTERISTICS

Output Voltage: ± 10 V dc or peak ac.

Output Current: 10 mA, 100 mA available optionally. Short-circuit protected.

Output (RTO) Zero: ± 10 V, ± 1 V, ± 0.1 V switch selectable, 20-turn potentiometer.

Gain Steps: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, plus a board-mounted 100:1 input divider switch.

Gain Accuracy: $\pm 0.1\%$.

Gain Stability: $\pm 0.01\%$ for 90 days; $\pm 0.005\%/^{\circ}$ C.

Gain Vernier: $\times 1$ to $\times 2.5$ with 20-turn potentiometer and in-out switch. (Gain continuous from 0.01 to 2500)

Linearity: $\pm 0.005\%$ of best straight line through zero.

POWER, DIMENSIONS, ENVIRONMENT

Amplifier: ± 16 V at 18 mA plus amplifier and excitation load currents.

Enclosures: 120/240 V ac, 50 to 60 Hz standard. Optional, +12 V dc or +28 V dc.

Operating Environment: 0° C to 50° C, 90% RH.

Storage Temperature: -25° C to $+71^{\circ}$ C.

Dimensions (Amplifier):

133 mm (5.25") H \times 23.3 mm (0.9") W \times 203 mm (8") D.

RTI = Referred to Input

RTO = Referred to Output

ORDERING INFORMATION

BASIC MODEL 560H TRANSDUCER CONDITIONING AMPLIFIER

FILTER AND OUTPUT OPTIONS

(One option, J through N, must be specified)

Filter Characteristic: 2-pole Bessel, low pass

Selectable Filter Frequencies: 10 Hz, 100 Hz, 1 kHz, 10 kHz plus a wideband position.

High-current Output: ± 10 V, 100 mA, short-circuit protected.

OPTION	WIDEBAND OUTPUT	FILTERED OUTPUT
J (Single Output)	10 mA	None
K (Single Output)	100 mA	None
L (Dual Output)	10 mA	10 mA
M (Dual Output)	100 mA	10 mA
N (Dual Output)	10 mA	100 mA

Specifications subject to change without notice.

ENCLOSURES

E513-2A: Two-unit enclosure. Includes 120/240V ac power supply and barrier strip for all inputs/outputs.

E513-6A: Six-unit enclosure. Includes 120/240V ac power supply and rear-panel connectors with mates for all inputs/outputs.

R513-16: Rack-mount enclosure accepts up to 16 Model 560H units. Includes 120/240V ac power supply and rear panel connectors with mates for all inputs/outputs.

ACCESSORIES

516-503-40: Single-channel Filler Panel

516-503-55: Four-channel Filler Panel

560-501-01: Extender Board

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