

Advanced Test Equipment Rentals www.atecorp.com 800-404-ATEC (2832)



Model 2210 Signal Conditioning Amplifier

Front-Panel Controls

GAIN CONTROLS: Continuously variable 1 to 3300. Gain potentiometer 1.00 to 11.00 plus gain switch X1, X10, X100, X300.

FILTER SWITCH: Selects appropriate low-pass filter or wideband operation.

MONITOR JACKS: For $\pm 10V$ output and bridge excitation.

EXCIT LED: Denotes constant-voltage (red) or constant-current (green) excitation.

EXCIT ON-OFF: Toggle switch removes excitation from the strain gage or transducer.

EXCIT POTENTIOMETER: Sets excitation level for constant-voltage and constant-current excitation.

CAL SWITCH: Selects A or B preset calibration configuration.

AUTO BAL SWITCH: Controls balance operation.

AUTO BAL LED: Denotes balance mode: green during auto balance interval; red for overrange.

BALANCE TRIM POTENTIOMETER: Refines bridge balance when desirable.

BALANCE LED: Indicates bridge balance (off), positive unbalance (red), or negative unbalance (green).

AMP ZERO POTENTIOMETER: Sets electrical zero of amplifier.

Shown actual size

Specifications

INPUT

Input Impedance:

AMP

ZERO

dc-coupled: 22 M\O shunted by 250 pF.

ac-coupled: 1.1 μ F in series with 20 k Ω ; low frequency cutoff (3 dB) 8 Hz nom.

Source Current: ±10 nA typical; ±20 nA maximum.

BAL

TRIM

STRUMENTS

Configuration: 2- to 10-wire plus guard shield accepts quarter-, half-, or full-bridge strain gage or transducer inputs. Internal half-bridge, dummy 350 Ω and dummy 120 Ω completion gages, remote sense and four-wire calibration capability provided. 1000Ω completion capability also provided. Accepts inputs from ground-referenced or isolated devices.

Differential Input: Maximum differential input voltage of ±50 Vdc or peak ac.

Common-Mode Input: Maximum common-mode input voltage of ±350 Vdc or peak ac.

Guard Impedance: Greater than 250 kΩ to output common; greater than 1000 M Ω to power and rack ground.

AMPLIFIER

Gain: 1 to 3300; continuously variable; direct reading. Gain steps X1, X10, X100, X300; with 10-turn counting knob, X1 to X11. Accuracy ±0.5%.

Linearity: ±0.01% of full scale at dc.

Frequency Response:

dc to 100 kHz: 3 \pm 0.2 dB at all gain settings and full output. dc to 50 kHz: 0.5 dB max at all gain settings and full output.

Gain Step vs Frequency Response (3 dB):

X300 100 kHz X10 135 kHz X100 120 kHz 240 kHz

Slew Rate: 6.3 V/µsec min at all gain settings.

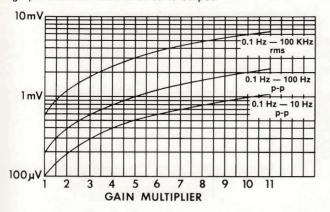
Noise: (350Ω source impedance, dc-coupled)

Referred-to-Input (RTI):

1 μ V 0.1 Hz to 10 Hz p-p; 2 μ V 0.1 Hz to 100 Hz p-p

 $3 \mu V 0.1 Hz$ to 100 kHz rms

Referred-to-Output (RTO): Output related noise is a function of the setting of the gain multiplier potentiometer. Refer to the graph below for noise referred-to-output.



Zero Stability: $\pm 2~\mu V$ RTI, $\pm 200~\mu V$ RTO at constant temp. Temperature Coefficient of Zero: $\pm 1~\mu V/^{\circ} C$ RTI, $\pm 100~\mu V/^{\circ} C$ RTO; -10° to $60^{\circ} C$.

Common-Mode Rejection:

GAIN CMR (dB) GAIN CMR (dB) X1 82 X100 122 X10 102 X300 135

Common-Mode Voltage: ±350 Vdc or peak ac, max operating.

Standard Output: ±10V @ 10 mA max; Tape Output: 1.0 Vrms @ 10 mA max; or

Output ac-coupled: ±10V @ 10 mA max (7 Hz, 3 dB).

Output Monitor: $\pm 10V$ standard monitored via front-panel jacks. Output Isolation: $> 1000~\text{M}\Omega$ from power and rack ground.

Output Protection: Protected against continuous short.

Capacitive Loading: Up to 0.15 μ F.

Low-Pass Filter: Four-pole Bessel low-pass filter with selectable 3 dB bandwidths of 1 Hz, 10 Hz, 100 Hz, 1 kHz and 10 kHz.

CONSTANT-VOLTAGE EXCITATION

Range: 0.50 to 15.0 Vdc @ 85 mA max. Noise: $\pm 100 \ \mu V \pm 0.002\% \ p$ -p dc to 20 kHz.

Line Regulation: $\pm 200 \mu V \pm 0.01\%$ max for line voltage change of 10% from nominal

10 % Hom Homman

Load Regulation: $\pm 200~\mu\text{V}$ $\pm 0.01\%$ max for load variation of 10% to 90% of full load.

Stability: $\pm 0.01\%$ °C or 100 μ V/°C, whichever is greater.

Remote Sense: Error $< 0.0005\%/\Omega$ of lead resistance.

Monitoring: Front-panel monitoring jacks.

Isolation: Isolated from power ground and output common; floats with guard.

CONSTANT-CURRENT EXCITATION

Range: 0.50 to 15.0 mA dc or 1.00 to 30.0 mA dc. Compliance voltage 0.50 to 16.0V.

Noise: $(1 \mu A + 10 \mu V)$ p-p; dc to 20 kHz.

Line Regulation: $\pm 1~\mu A~\pm 0.01\%$ max for line voltage change of $\pm 10\%$ from nominal.

Load Regulation: $\pm 1~\mu\text{A}~\pm 0.01\%$ max for 100% load change.

Stability: $\pm 0.01\%$ /° C or 1 μ A/° C, whichever is greater.

Monitoring: Front-panel monitoring jacks; 10 mV/mA. Isolation: Isolated from power ground and output common; floats

with Guard.

BALANCE

Method: Electronically injected automatic balance.

Range: $\pm 15~000 \mu \epsilon$ (7.5 mV/V) RTI (X2 with internal jumper).

Resolution: $0.50\mu\epsilon$ RTI (X2 with internal jumper). Balance Time: 4 seconds typical; 8 seconds max.

Accuracy: ± 2 mV RTO; $\pm 2\mu\epsilon$ RTI. Balance Trim: $\pm 375\mu\epsilon$ (188 μ V/V) RTI.

Storage: Digital with battery backup. Battery life 3-5 years.

Activation: Activated by front-panel switch or by optically isolated remote switch or low TTL level.

CALIBRATION.

Four internal shunt calibration resistors, ±0.1% tolerance:

174.8K 1000 μ ε (0.50 mV/V) 350 Ω bridge; 874.8K 200 μ ε (0.10 mV/V) 350 Ω bridge; 59.94K 1000 μ ε (0.50 mV/V) 120 Ω bridge.

Activated by front-panel switch, or by optically isolated remote contact closure or low TTL level.

Internal selector switches for selection of two-point unipolar, bipolar, or two-point double shunt calibration circuits.

Calibration resistors plug into fixed terminals (no soldering).

SIZE

7 H x 1.71 W x 17.88 D in (178 x 43 x 454 mm).

WEIGHT

3.7 lb (1.67 kg).

All references to microstrain assume a gage factor of 2.00.

