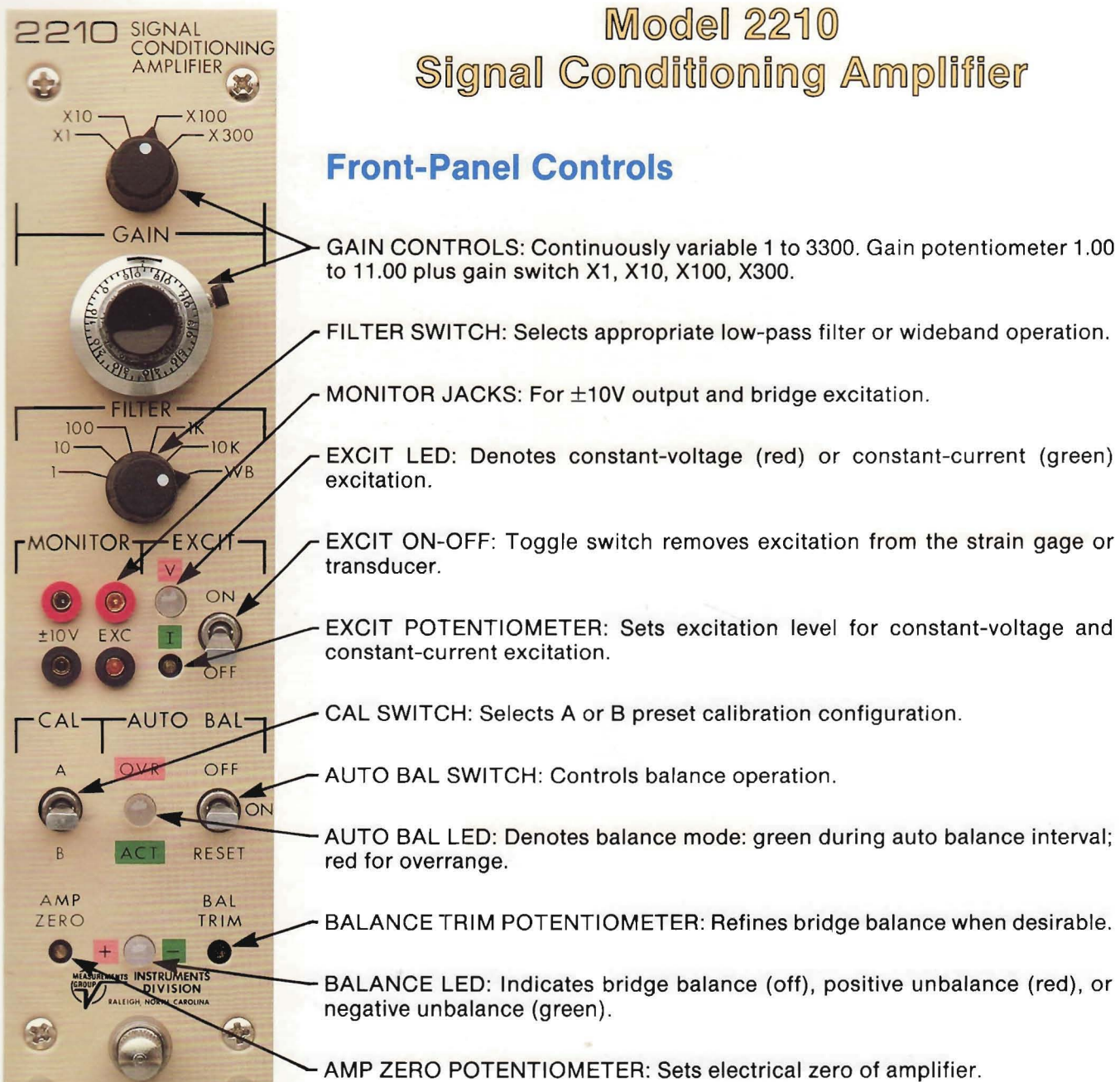


Model 2210 Signal Conditioning Amplifier

Front-Panel Controls



Shown actual size

Specifications

INPUT

Input Impedance:
dc-coupled: 22 M Ω 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: \pm 10 nA typical; \pm 20 nA maximum.

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. 1000 Ω completion capability also provided. Accepts inputs from ground-referenced or isolated devices.

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

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

Guard Impedance: Greater than 250 k Ω 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 \pm 0.5%.

Linearity: \pm 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	X1	240 kHz

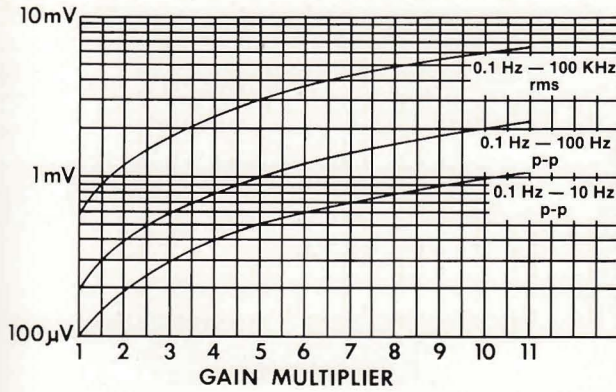
Slew Rate: 6.3 V/ μ sec min at all gain settings.

Noise: (350 Ω 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 μ 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: $\pm 2 \mu\text{V RTI}$, $\pm 200 \mu\text{V RTO}$ at constant temp.
 Temperature Coefficient of Zero: $\pm 1 \mu\text{V}/^\circ\text{C RTI}$, $\pm 100 \mu\text{V}/^\circ\text{C RTO}$; -10° to 60°C .

Common-Mode Rejection:

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

Common-Mode Voltage: $\pm 350 \text{ Vdc}$ or peak ac, max operating.

Standard Output: $\pm 10\text{V @ } 10 \text{ mA max}$;

Tape Output: $1.0 \text{ Vrms @ } 10 \text{ mA max}$; or

Output ac-coupled: $\pm 10\text{V @ } 10 \text{ mA max}$ (7 Hz, 3 dB).

Output Monitor: $\pm 10\text{V}$ 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 $0.15 \mu\text{F}$.

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: $\pm 100 \mu\text{V} \pm 0.002\%$ p-p dc to 20 kHz.

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

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

Stability: $\pm 0.01\%/^\circ\text{C}$ or $100 \mu\text{V}/^\circ\text{C}$, 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: $(1 \mu\text{A} + 10 \mu\text{V})$ p-p; dc to 20 kHz.

Line Regulation: $\pm 1 \mu\text{A} \pm 0.01\%$ 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: $\pm 0.01\%/^\circ\text{C}$ or $1 \mu\text{A}/^\circ\text{C}$, 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: $\pm 2 \text{ mV RTO}$; $\pm 2 \mu\epsilon$ RTI.

Balance Trim: $\pm 375 \mu\epsilon$ ($188 \mu\text{V/V}$) 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, $\pm 0.1\%$ tolerance:

174.8K	1000 $\mu\epsilon$ (0.50 mV/V)	350 Ω bridge;
874.8K	200 $\mu\epsilon$ (0.10 mV/V)	350 Ω bridge;
59.94K	1000 $\mu\epsilon$ (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.

PC-Board Controls

