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Find the *Vishay Measurements 2310* at our website: ***Click HERE***

Signal Conditioning Amplifier

FEATURES

- Accepts all strain gage inputs (foil and piezoresistive), potentiometers, DCDT's, etc
- Selectable bridge excitation, 0.7 to 15 VDC (11 steps), plus 0.2 to 7 VDC continuously variable
- Fully adjustable calibrated gain from 1 to 11,000
- Dual-range (±5000 με and ±25,000 με) automatic bridge balance, with "keep-alive" power to preserve balance for months without external power
- All bridge completion built in, including 120- or 1000- and 350-ohm dummies
- Dual polarity two-step double shunt calibration
- Bandpass:
  - 76 kHz (–0.5 dB)
  - 155 kHz (–3 dB)
- Switchable active filter—a 6-pole Butterworth is standard
- Two simultaneous buffered outputs
- Playback mode to filter and observe or re-record previously recorded low-level data
- Input impedance above 100 megohms



DESCRIPTION

The 2300 System conditions and amplifies low-level signals to high-level outputs for multiple-channel, simultaneous dynamic recording and display on external devices.

Among its features, each 2310B Module includes a built-in power supply, active filtering, two simultaneous outputs, playback mode, wide frequency response, and voltage injection bridge balance.

Up to ten 2310B Modules can be mounted in a Model 2350 Rack Adapter; or up to four modules in a Model 2360B Portable Enclosure; or, a single 2310B can serve as a standalone unit using the 2310-A20 Line Cord and Stabilizer.

The 2310B Modules may be interchanged between the 2350 Rack Adapter and the 2360B Portable Enclosure to best satisfy testing requirements.

MODEL 2310B SIGNAL CONDITIONING AMPLIFIER

The 2310B Conditioner/Amplifier Modules accept inputs from strain gages, load/pressure/DC displacement transducers, potentiometers, RTD's and nickel temperature sensors, without any internal modification.

Controls on the 2310B are arranged in sections, permitting easy setup. Clearly marked push-button and single-purpose switches minimize the possibility of operator error during use. With the exception of the playback switch, all operational and monitor controls are on the front panel. Switches for selecting remote sense and specific shunt calibration configurations are located on the printed circuit board inside the unit.



FRONT PANEL

- Calibration: Momentary two-position switches, ±A and ±B, control shunt calibration levels; 4 point
- LED Display: Set up indicator for amplifier balance, bridge balance and for monitoring the output polarity
- Filter Section: Push-button controls for activating appropriate low- and high-pass active filters
- Electronic Bridge Balance Section: Three-position switch—OFF, ON, RESET—for electronic bridge balance; auto ranging up to ±25 000 με with nonvolatile zero storage; yellow light indicates high-range operation or over range condition
- Vernier trim control is used to refine bridge balance when desired
- AC IN: Capacitive coupling in the amplifier; eliminates static component of the signal
- Bridge Excitation: ON-OFF switch for removing bridge excitation from the strain gage or transducer for noise documentation
- Amplifier Balance: Adjusts amplifier offset
- Excitation Level: Twelve-position switch; values arranged for doubling power with each step, with one 0.2 to 7 VDC continuously variable
- Amplifier Gain Section: Continuously variable potentiometer (1.00 to 11.00) plus push-button course gain multipliers control amplifier gain; direct-reading
- Battery Test: Momentary push button determines battery level for bridge zero storage
- Main Power: Turns unit on/off; LED pilot light
- Pin Jacks: Monitoring of Excitation, Unamplified Input, Amplified Output

Signal Conditioning Amplifier

- AC Line Switch: Selects nominal 115 or 230 VAC operation.
- Playback Section: Slide switch activates playback operating mode. Connects the input to the filter circuits and post amplifiers. BNC input connector.
- Low-level Output: Full-scale ±1.4V level available at this BNC connector for driving various recording devices and low-level analog-to-digital converters.
- High-Level Output: Full-scale ±10V level available at this BNC connector for driving an oscilloscope, digital voltmeter, analog-to-digital converter, etc.
- Input Receptacle: All sensor inputs made through this 15-pin quarter-turn connector. Pin selection determines mode of operation (mating plug included).
- Power Connector: Main power input from the rack adapter, portable enclosure or individual line plug. Additional pins for optional remote operation of shunt calibration, bridge excitation (ON/OFF), and electronic bridge balance.



REAR PANEL

SPECIFICATIONS

All specifications are nominal or typical at +23°C unless noted. Performance may be degraded in the presence of high-level electromagnetic fields.

INPUT

Strain Gages

Quarter, half or full bridge (50Ω to 1000Ω)

Built-in 120Ω and 350Ω dummy gages; 1000Ω dummy capability

Transducers

Foil or piezoresistive strain gage types

DCDT displacement transducers

Potentiometers

EXCITATION

Eleven Fixed Settings

0.7, 1, 1.4, 2, 2.7, 3.5, 5, 7, 10, 12 and 15 VDC

1% max.

One Variable Setting

0.2 to 7 VDC

Current

0–100 mA, min, limited at 175 mA, max.

Regulation (0–100 mA ±10% line change)

±0.5 mV; ±0.04%, max measured at remote sense points. (Local sense: –5 mV, typical, @ 100 mA, measured at plug)

Remote Sense Error

0.0005% per Ω of lead resistance (350Ω load)

Noise and Ripple

0.05% p-p, max (DC to 10 kHz)

Stability

±0.02%/°C

Level

Normally symmetrical about ground; either side may be grounded with no effect on performance

BRIDGE BALANCE

Method

Counter-emf injection at pre-amp; automatic electronic; dual range; can be disabled on front panel

Ranges (auto ranging)

±5000 με (±1% bridge unbalance or ±2.5 mV/V), resolution 2.5 με (0.0012 mV/V)

±25,000 με (±5% bridge unbalance or ±12.5 mV/V), resolution 12.5 με (0.006 mV/V)

Balance Time

2 seconds, typical

Manual Vernier Balance Range

100 με (0.050 mV/V)

Interaction

Essentially independent of excitation and amplifier gain

Storage

Non-volatile digital storage without line power for up to two years

SHUNT CALIBRATION

Circuit (two-level, dual polarity)

Single-shunt (for stress analysis) across any bridge arm, including dummy gage

Double-shunt (for transducers) across opposite bridge arms

Provision for four dedicated leads to shunt external arms

CAL circuit selected by switches on PC board

Standard Factory-Installed Resistors (±0.1%) Simulate

±200 and ±1000 με @ GF=2 across dummy half bridge; ±1000 με @ GF=2 across dummy gage (120Ω and 350Ω).

±1 mV/V (double shunt) for 350Ω transducer

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Remote-Operation Relays (Option Y)

Four relays (plus remote-reset relay for bridge balance and relay for excitation on/off). Each relay requires 10 mA @ 5 VDC except excitation on/off 25 mA

AMPLIFIER

Gain

1 to 11, 000 continuously variable. Direct reading, ±1% max. 10-turn counting knob (X1 to X11) plus decade multiplier (X1 to X1000)

Frequency Response, All Gains Full Output

DC coupled: DC to 145 kHz, –3 dB max.

DC to 60 kHz, –0.5 dB max.

AC coupled: 1.7 Hz typ. to 150 kHz, –3 dB max.

Frequency Response Versus Gain, Full Output:

Gain	–0.5 dB	–3 dB
1-11	130 kHz	300 kHz
10-110	110 kHz	250 kHz
100-1100	80 kHz	160 kHz
1000-11000	76 kHz	155 kHz

Slew Rate

7.8 V/µs typical

Input Impedance

100 mΩ, min, differential or common-mode, including bridge balance circuit

Bias Current

±40 nA, typical max., each input

Source impedance

0 to 1000Ω each input

Common-Mode Voltage

±10V

Common-Mode Rejection (gain over X100)

Shorted input: 100 dB, min, at DC to 60 Hz;

90 dB, min, DC to 1 kHz;

350Ω balanced input: 90 dB, typical, DC to 1 kHz

Stability (gain over X100)

±2 µV/°C, max, RTI (referred to input)

Noise (gain over X100, all outputs)

0.01 to 10 Hz: 1 µV p-p RTI

0.5 to 125 kHz: 6µ VRMS, max, RTI

FILTER

Characteristic

Low-pass active six-pole Butterworth standard

Frequencies (–3 ±1 dB)

10, 100, 1000 and 10,000 Hz and wide-band

Outputs Filtered

Either one or both (switch-selected on printed circuit board)

AMPLIFIER OUTPUTS

Standard Output

±10V @ 5 mA, min.

Slew Rate: 7.8 V/µs (typical)

Low-Level Output

±1.414V (1 VRMS) @ 5 mA, min.

Linearity @ DC

±0.02%;

Either output can be short-circuited with no effect on the other

PLAYBACK

Input

±1.414V full scale; input impedance 20 kΩ

Gain

X1 to low-level output; X7.07 to standard output

Filter Selection

As specified above

Outputs

Both as specified above

OPERATING ENVIRONMENT

Temperature

0°C to +50°C

Humidity

10% to 90%, noncondensing

POWER

105V to 125V or 210V to 250V (switch-selected), 50/60 Hz, 10 watts, max.

Keep-Alive Supply (for bridge balance)

Lithium 3.6V, 1/2 AA or equal

Shelf life approximately two years

SIZE AND WEIGHT

Panel

8.75 H x 1.706 W in (222.2 x 43.3 mm)

Case Depth Behind Panel

15.9 in (404 mm)

Weight

6 lb (2.7 kg)

Signal Conditioning Amplifier

MODEL 2350 RACK ADAPTER



A prewired rack adapter which accepts up to ten Model 2310B plug-in amplifier modules. The Model 2350 also fits standard 19-in (483-mm) mainframe electronic equipment racks so that multi-channel system configurations can be conveniently housed.

SPECIFICATIONS

APPLICATION

Fits standard 19-in (483-mm) electronic equipment rack

Accepts up to ten 2310B Amplifiers

AC line completely wired

Wiring for remote calibration with Option Y

POWER

115 or 230 VAC switch selected in amplifiers, 50/60 Hz, 100 Watts max.

SIZE AND WEIGHT

8.75 H x 19 W x 19.06 D overall (222 x 483 x 484 mm)

13.5 lb (6.1 kg)

MODEL 2360B 4-CHANNEL ENCLOSURE



Model 2360B Portable Enclosure includes all AC wiring Accepts up to four amplifier modules.

SPECIFICATIONS

APPLICATION

Enclosure to accept up to four 2310B Amplifiers

AC wiring complete

Wiring for remote calibration with Option Y

POWER

115 or 230 VAC (switch selected in amplifiers), 50/60 Hz, 100 Watts max.

SIZE AND WEIGHT

9.06 H x 7.20 W x 18.90 D in (229 x 183 x 480 mm)

6.75 lb (3.1 kg)

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