



### PROVEN PANEL METER FOR SIGNAL CONDITIONING OF DC STRAIN GAGE SENSORS & TRANSDUCERS - COMBINES SIGNAL CONDITIONER (3170) WITH DISPLAY (3270) & LIMIT CONTROL (3370)

The Models **3170**, **3270**, and **3370** DC Strain Gage Conditioners are highly accurate DC instruments for use with load cells, pressure sensors, and other strain gage transducers employing a 4-arm bridge. The Model **3170** Strain Gage Conditioner is the basic Form 1 instrument. The Model **3270** Strain Gage Conditioner/ Indicator is the Form 2 instrument, providing vivid frontpanel digital indication of measured values, scalable in desired engineering units. The Model **3370** Strain Gage Conditioner/Indicator/Controller is the Form 3 instrument, and includes HI/LO limit detection with control output. Advanced circuit design overcomes many of the errors traditionally afflicting the strain gage measurement process, resulting in three high-level, drift-free, noise-free analog outputs (see Specifications). Nearly all mechanical measurement and control requirements are covered by these three simultaneously available outputs.

Other important features include:

- remote sensing and regulation of bridge excitation—eliminates errors from temperature effects on cable resistance
- seven-wire calibration circuitry—applies the internal shunt calibration resistor at the transducer terminals, thereby eliminating significant calibration transfer error in long-cable installations
- true differential input, with better than 80 dB of common-mode rejection—eliminates errors from common-mode pickup and possible “ground-loop” coupling
- input impedance in excess of 100 megohms preserves the validity of factory calibration, prevents conversion of commonmode to normal-mode signals, and eliminates remaining errors attributable to cable resistance. Allowable cable length has virtually no practical limits.
- elimination of both short-term and long-term drift through an advanced solid-state chopper stabilization technique, while preserving the full frequency passband, free of chopper noise; the rated accuracy is obtained without “warm-up” period or periodic “tweaking” of controls
- active low-pass filtering smooths unwanted dynamic signal components arising from vibration, power impulses, etc., that might prevent stable digital conversion or control action

For conditioning inputs from AC-excited strain gage transducers, see the Models **3178**, **3278**, and **3378**.

# MODEL 3170/3270/3370

## DC STRAIN GAGE PANEL INSTRUMENT

### [3000 SERIES]

## SPECIFICATIONS

**Input Type:** Conventional 4-arm strain gage bridge, nominal 90 to 2000 Ohm

**Input Range** (full-scale): Nominal sensitivity 1 to 8 mV/V, full scale\*

**Excitation Supplied:** Regulated 5 or 10 V-DC, user selectable\*\*

**Analog Outputs:** Three outputs, each  $\pm 5$  V full-scale with 50% overrange, 5 mA max.; low-pass corner frequencies of 2 Hz, 200 Hz, and 2 kHz, respectively

**Common-Mode Rejection:** Greater than 80 dB  
Input Impedance: Greater than 100 M $\Omega$

**Analog Filtering:** Active low-pass filters provide -60 dB per decade above cutoff frequency ("f"); full-scale slew time is 1.4/f sec

**Output Ripple and Noise:** 0.15% of full scale (rms) max. for 200-Hz and 2-kHz outputs; 0.02% of full scale (rms) max. for 2-Hz output

**Accuracy** (typical, following Calibration): 0.05% of full scale  
Display Resolution (Models 3270 and 3370): 0.02% of full scale\*\*\*

### Physical / Environmental

**Case:** Each unit is housed in a single piece of heavy gage aluminum (1.7" H x 4.41" W x 7.0" D); a simple reassembly procedure allows mounting in the user's precut panel; the Model 3004 Rackmount Adaptor permits secure mounting of up to four units in a standard 19-inch rack

**Operating Temperature Range:** 0° F to +130° F (-18°C to +55° C); assumes dry, noncondensing ambient atmosphere

**Weight: Instrument:** approximately 2.0 lb (0.9 kg) maximum;  
Shipping: approximately 3.5 lb (1.6 kg) maximum

\* Ten-turn coarse and fine front-panel controls will balance 1.5 mV/V initial unbalance and allow span adjustment over the stated full-scale sensitivity.

\*\* Transducers with sensitivity from 4 to 8 mV/V, full scale, or with bridge resistance of 120 Ohm or less, must use 5-V excitation.

\*\*\* Includes the combined effects of nonlinearity, random noise, line-voltage variation between 105 and 130 volts, ambient temperature variation of  $\pm 20^\circ$  F about starting value, and six months drift of zero and span. Errors attributable to the transducer are not included.

**Power Voltage:** 105-135 V-AC; 210-260 V-AC optional (add suffix "F" to model number); any model not employing the solid-state relay ("S") option may be powered by battery (11.5-15 V-DC, 500 mA max.; add suffix "B" to model number)

**Frequency:** 50-400 Hz

**Consumption:** 5 W max. (for Form 1 instruments), 8 W max. (for Form 2 instruments), or 9 W max. (for Form 3 instruments) Display (Form 2 and Form 3 instruments only)

**Display:** Orange LED's, six digits with polarity sign, 0.4" (1.0 cm) height; Most Significant Digit of display is either unlit or reads "1," and in either case contains polarity sign; Least Significant Digit is a dummy zero which may be lit or unlit, as desired

**Scaling:** Selectable at rear panel; full-scale values of  $\pm 5000$  counted by "1's,"  $\pm 10000$  counted by "2's," or  $\pm 20000$  counted by "5's," with selectable decimalpoint locations (along with dummy zero) to give decade multiplier factors of 10, 1.0, 0.1, 0.01, 0.001, or 0.0001

**Display Sampling Update Rate:** 3 samples per second

**Limit Logic Outputs** (Form 3 instruments only) Both true and complement available for each limit condition (LOW, OK, HIGH); TTL-compatible, wire-ORable; 10-mA sink, 0.5-mA source (max.); normally nonlatching, but latching outputs are also available

3000 Series options applying to the DC Strain Gage instruments include

- Analog Peak Capture (Models 3270 and 3370)
- 4-20 mA Current Output (Models 3170, 3270, and 3370)
- 0-10 V-DC Dual Galvanic Isolated Outputs (Models 3170 and 3270)
- Internal Electromechanical Relays (Model 3370)
- Internal Solid-State Relays (Model 3370)
- 12 V-DC Battery-Powered Operation or Nominal 230 V-AC Operation (Models 3170, 3270, and 3370)