

# 8B37



## Non-Linearized Thermocouple Input Modules

### Description

8B modules are an optimal solution for monitoring real-world process signals and providing high-level signals to a data acquisition system. Each 8B37 non-linearized module isolates, filters, and amplifies a single channel of temperature input from a thermocouple input signal and provides an analog voltage output.

The 8B37 can interface to industry standard thermocouple types J, K, T, R, and S and has an output signal of 0 to +5V. Each module is cold-junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and screw terminals on the mounting backpanel. Upscale open thermocouple detect is provided by an internal pull-up resistor.

Signal filtering is accomplished with a 3-pole filter optimized for time and frequency response which provides 70dB of normal-mode rejection at 60Hz. One pole of this filter is on the field side of the isolation barrier for anti-aliasing, and the other two are on the system side.

A special input circuit on the 8B37 module provides protection against accidental connection of power-line voltages up to 240VAC. Clamp circuits on the I/O and power terminals protect against harmful transients.

The modules are designed for installation in Class I, Division 2 hazardous locations and have a high level of immunity to environmental noise.

### ► Features

- Interfaces to Types J, K, T, R, and S Thermocouples
- High-Level Voltage Output
- 1500Vrms Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protection to 240VAC Continuous
- 120dB CMR
- 70dB NMR at 60Hz
- ±0.05% Accuracy
- ±0.02% Linearity
- Low Drift with Ambient Temperature
- Accurate CJC -40°C to +85°C
- CE Compliant
- UL Listing Pending
- Mix and Match Module Types on Backpanel

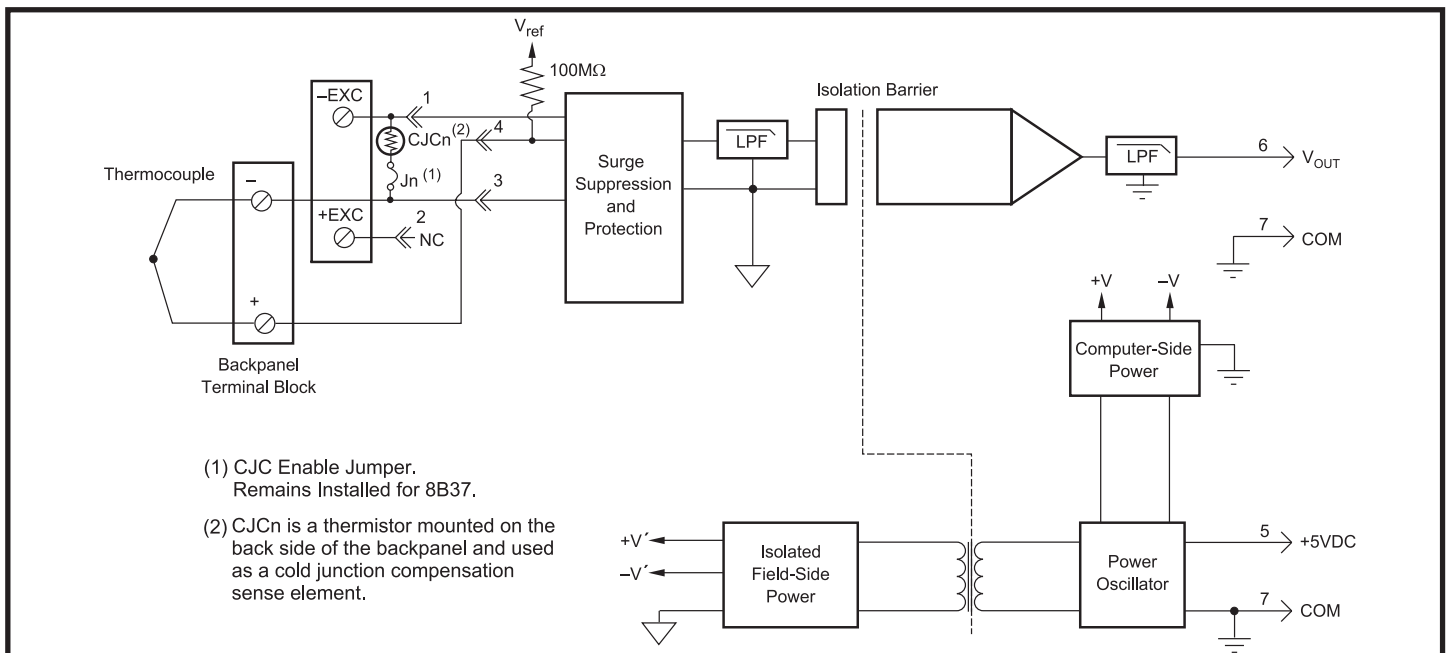


Figure 1: 8B37 Block Diagram

**Specifications** Typical at  $T_A = +25^\circ\text{C}$  and +5V power

Module	8B37
Input Range	See Ordering Information
Input Bias Current	-25nA
Input Resistance	
Normal	50M $\Omega$
Power Off	200k $\Omega$
Overload	200k $\Omega$
Input Protection	
Continuous <sup>(1)</sup>	240VAC
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	1500Vrms max
Transient, Input to Output	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	120dB
NMR	70dB at 60Hz
Accuracy	See Ordering Information
Linearity	$\pm 0.02\%$ Span
Stability	
Offset	$\pm 20\text{ppm}/^\circ\text{C}$
Gain	$\pm 50\text{ppm}/^\circ\text{C}$
Noise	
Output, 100kHz	250 $\mu\text{Vrms}$
Bandwidth, -3dB	3Hz
Response Time, 90% Span	150ms
Output Range	0V to +5V
Output Protection	Continuous Short to Ground
Transient	ANSI/IEEE C37.90.1
Cold Junction Compensation	
Accuracy, 25 $^\circ\text{C}$	$\pm 0.5^\circ\text{C}$
Accuracy, -40 $^\circ\text{C}$ to +85 $^\circ\text{C}$ (J,K,T)	$\pm 1.5^\circ\text{C}$
Accuracy, -20 $^\circ\text{C}$ to +65 $^\circ\text{C}$ (R,S)	$\pm 3.0^\circ\text{C}$
Accuracy, -40 $^\circ\text{C}$ to +85 $^\circ\text{C}$ (R,S)	$\pm 5.0^\circ\text{C}$
Open Input Response	Upscale
Open Input Detection Time	<10s
Power Supply Voltage	+5VDC $\pm 5\%$
Power Supply Current	30mA
Power Supply Sensitivity	$\pm 75\text{ppm}/\%$
Mechanical Dimensions (h)(w)(d)	1.11" x 1.65" x 0.40" (28.1mm x 41.9mm x 10.2mm)
Environmental	
Operating Temperature Range	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
Storage Temperature Range	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A $\pm 0.5\%$ Span Error
ESD, EFT	Performance B

**NOTES:**

- (1) 240VAC between +Input terminal and -Input, +EXC, or -EXC terminals.  
 120VAC between -Input and +EXC or -EXC terminals.  
 120VAC between +EXC and -EXC terminals.  
 (2) Includes linearity, hysteresis and repeatability. Does not include CJC accuracy.

**Ordering Information**

Model	TC Type <sup>‡</sup>	Input Range	Output Range	Accuracy <sup>(2)</sup>	
8B37J	J	-100 $^\circ\text{C}$ to +760 $^\circ\text{C}$ (-148 $^\circ\text{F}$ to +1400 $^\circ\text{F}$ )	0V to +5V	$\pm 0.05\%$	$\pm 0.43^\circ\text{C}$
8B37K	K	-100 $^\circ\text{C}$ to +1350 $^\circ\text{C}$ (-148 $^\circ\text{F}$ to +2462 $^\circ\text{F}$ )	0V to +5V	$\pm 0.05\%$	$\pm 0.73^\circ\text{C}$
8B37T	T	-100 $^\circ\text{C}$ to +400 $^\circ\text{C}$ (-148 $^\circ\text{F}$ to +752 $^\circ\text{F}$ )	0V to +5V	$\pm 0.05\%$	$\pm 0.25^\circ\text{C}$
8B37R	R	0 $^\circ\text{C}$ to +1750 $^\circ\text{C}$ (+32 $^\circ\text{F}$ to +3182 $^\circ\text{F}$ )	0V to +5V	$\pm 0.05\%$	$\pm 0.88^\circ\text{C}$
8B37S	S	0 $^\circ\text{C}$ to +1750 $^\circ\text{C}$ (+32 $^\circ\text{F}$ to +3182 $^\circ\text{F}$ )	0V to +5V	$\pm 0.05\%$	$\pm 0.88^\circ\text{C}$

**‡ Thermocouple Alloy Combinations**

Standards: DIN IEC 584, ANSI MC96-1-82, JIS C 1602-1981

Type	Material
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum