

5B40/5B41 Isolated, Wide Bandwidth Millivolt and Voltage Input

Functional Description

The 5B40 and 5B41 are wide-bandwidth single-channel signal conditioning modules that amplify, protect, filter and isolate analog input voltages. Both modules provide a 10 kHz bandwidth which ideally suits them to measuring signals that vary rapidly with time. Examples include pressure inside a plastic injection molding machine, strain on an automobile chassis during a crash test and vibrations on a machine bearing shortly before failure.

The 5B40 and 5B41 protect the computer side from damage due to field-side overvoltage faults. All models withstand 240 V rms at their input terminals without damage thereby shielding computer-side circuitry from field-side overvoltage conditions. In addition, 5B40 and 5B41 Series modules are mix-and-match and hot swappable, so can be inserted or removed from any socket in the same backplane without disrupting system power.



Inside 5B40/5B41 Modules

A chopper-stabilized input amplifier provides low drift and stable gain. At the amplifier input, a stable, laser-trimmed zero-scale input voltage is subtracted from the input signal to set the zero-scale value. For user convenience, the zero can be optionally factory-set to meet custom needs. This allows suppression of a zero-scale input value many times larger than the total span for precise expanded-scale measurements.

A single-pole anti-aliasing filter resides at each modules input. A three-pole, low-pass filter in the output stage sets the bandwidth and yields optimal noise performance for accurate measurement of small signals in high electrical noise.

Signal isolation by transformer coupling uses a proprietary modulation technique for linear, stable and reliable performance. The differential input circuit on the field side is fully floating, eliminating the need for any input grounding. A demodulator on the computer side of the signal transformer recovers the original signal, which is then filtered and buffered to provide a low-noise, low-impedance output signal. The output common must be kept within 3 Vdc of power common.

Convenience Features

A series output switch eliminates the need for external multiplexing in many applications. The switch is turned on by an active-low enable input. The enable input should be grounded to power common if the output need not be switched.

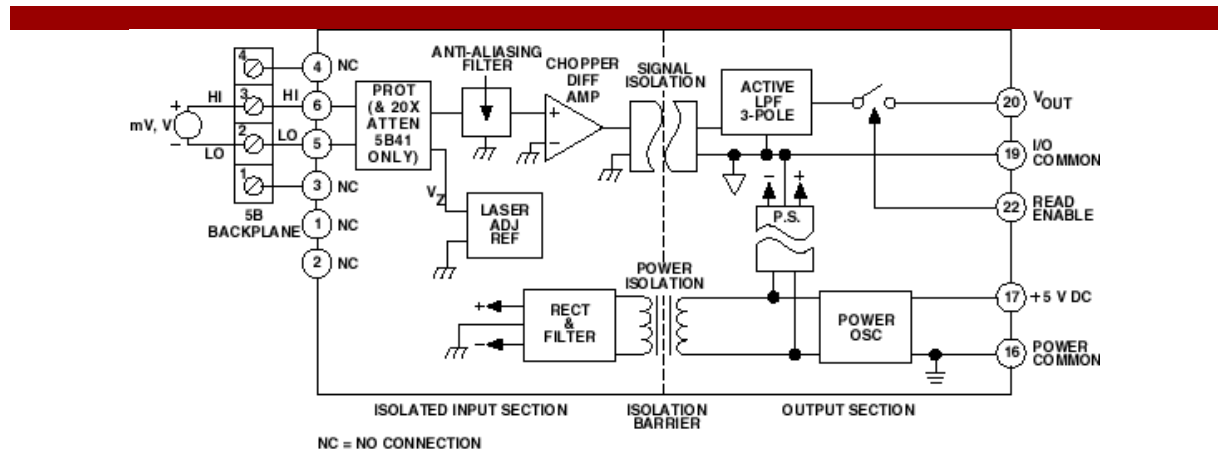


Figure 1. 5B40 and 5B41 Functional Block Diagram

Input Ranges

5B40 mV Input:
 ± 10 mV to ± 100 mV
 (± 5 mV to ± 500 mV custom)

5B41 V Input:
 ± 1 V to ± 20 V
 (± 0.5 V to ± 20 V custom)

Output Ranges

5B40/5B41:
 -5 V to +5 V or 0 to +5 V

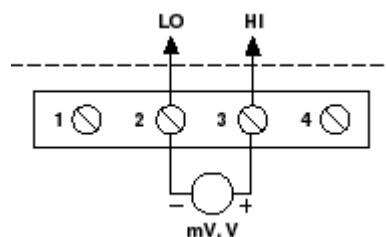


Figure 2. 5B40 and 5B41 Input Field Connections

5B40 and 5B41 Models Available

Model	Input Range	Output Range
5B40-01	-10 mV to +10 mV	-5 V to +5 V
5B40-02	-50 mV to +50 mV	-5 V to +5 V
5B40-03	-100 mV to +100 mV	-5 V to +5 V
5B40-04	-10 mV to +10 mV	0 V to +5 V
5B40-05	-50 mV to +50 mV	0 V to +5 V
5B40-06	-100 mV to +100 mV	0 V to +5 V
5B40-Custom	*	*

Model	Input Range	Output Range
5B41-01	-1 V to +1 V	-5 V to +5 V
5B41-02	-5 V to +5 V	-5 V to +5 V
5B41-03	-10 V to +10 V	-5 V to +5 V
5B41-04	-1 V to +1 V	0 V to +5 V
5B41-05	-5 V to +5 V	0 V to +5 V
5B41-06	-10 V to +10 V	0 V to +5 V
5B41-07	-20 V to +20 V	-5 V to +5 V
5B41-Custom	*	

5B40 and 5B41 Specifications

Description	Model 5B40	Model 5B41
Input Ranges		
Standard Ranges	±10 mV to ±100 mV	±1 V to ±20 V
Custom Ranges	±5 mV to ±500 mV	±0.5 V to ±20 V
Output Ranges (R_L > 50 kΩ)⁴	-5 V to +5 V or 0 V to +5 V	*
Accuracy²		
Initial @ +25°C	±0.05% Span ±10 μ V RTI ±0.05% (Vz ¹)	±0.05% Span ±0.05% (Vz ¹)
Nonlinearity	±0.02% Span	*
Input Offset vs. Temperature	±1 μ V/°C	±20 μ V/°C
Output Offset vs. Temperature	±40 μ V/°C	*
Gain vs. Temperature	±25 ppm of Reading/°C	±50 ppm of Reading/°C
Input Bias Current	±3 nA	±0.2 nA
Input Resistance		
Power On	200 M Ω	650 k Ω
Power Off	40 k Ω	650 k Ω
Overload	40 k Ω	650 k Ω
Noise		
Input, 0.1 Hz to 10 Hz Bandwidth	0.4 μ V rms	2 μ V rms
Output, 100 kHz Bandwidth	10 mV peak-peak	*
Bandwidth, -3 dB	10 kHz	*
Output Rise Time, 10% to 90% Span	35 μ s	*
Common-Mode Voltage (CMV)³		
Input-to-Output, Continuous	1500 V rms, maximum	*
Output-to-Power, Continuous	±3 V maximum	*
Transient	ANSI/IEEE C37.90.1-1989	*
Common-Mode Rejection (CMR)		
1 k Ω Source Imbalance, 50/60 Hz	100 dB	90 dB
Normal Mode Rejection	-3 dB @ 10 kHz	*
Input Protection		
Continuous	240 V rms, maximum	*
Transient	ANSI/IEEE C37.90.1-1989	*
Output Resistance	50 Ω	*
Voltage Output Protection	Continuous Short to Ground	*
Output Selection Time	6 μ s @ C _{load} = 0 to 2,000 pF	*
Output Enable Control		
Max Logic "0"	+1 V	*
Min Logic "1"	+2.5 V	*
Max Logic "1"	+36 V	*
Input Current "0"	0.4 mA	*
Power Supply Voltage	+5 V ±5%	*
Power Supply Current	30 mA	*
Power Supply Sensitivity, RTI	±2 μ V/Vs%	±0.4 mV/Vs%
Mechanical Dimensions	2.275" x 2.375" x 0.595" (57.8 mm x 59.1 mm x 15.1 mm)	*
Environmental		
Temperature Range		
Rated Performance	-25°C to +85°C	*
Operating	-40°C to +85°C	*
Storage	-40°C to +85°C	*
Relative Humidity	0 to 93% @ +40°C noncondensing	*
RFI Susceptibility	±0.5% Span error @ 400 MHz, 5 Watt, 3 ft	*