

**FEATURES**

- **Rugged, Compact, Low Cost Signal Conditioners**
- **Analog Input Modules for Direct Interface to Sensors: Thermocouples, RTDs, and Strain Gages**  
**Millivolt and Voltage Sources**  
**4-20mA or 0-20mA Process Current Inputs**
- **Analog Output Module**  
**4-20mA or 0-20mA Process Current Output**
- **Complete Signal Conditioning Function**  
**240V rms Field Wiring Protection, Filtering,**  
**Amplification, 1500V rms CMV Isolation,**  
**High Noise Rejection, RFI/EMI Immunity, and**  
**Wide Range Zero Suppression**
- **High Accuracy:  $\pm 0.05\%$**
- **Low Drift:  $\pm 1\mu V/^{\circ}C$**
- **$-25^{\circ}C$  to  $+85^{\circ}C$  Temperature Range**
- **Mix and Match Module Capability**
- **Convenient Connection to User's Equipment**
- **Simplified Designer Application**
- **Custom Ranged Modules Available**
- **FM Approved**

**Approved for Use in Class I, Division 2,  
Groups A, B, C and D Locations**

**GENERAL DESCRIPTION**

The 5B Series represents an innovative generation of low cost, high performance plug-in signal conditioners. Designed for industrial applications, these modules incorporate a new circuit design utilizing transformer-based isolation and automated surface mount manufacturing technology. They are compact, economical components whose performance exceeds that available from more expensive devices. Combining 1500V rms continuous CMV isolation,  $\pm 0.05\%$  calibrated accuracy, small size and low cost, the 5B Series is an attractive alternative to expensive signal conditioners and in-house designs.

All modules are hard potted and identical in pinout and size ( $2.25" \times 2.25" \times 0.60"$ ). They can be mixed and matched, permitting users to address their exact needs, and may be changed without disturbing field wiring. The isolated input modules provide 0 to +5V or  $\pm 5V$  outputs and accept J, K, T, E, R, S and B thermocouples; 100 $\Omega$  platinum, 10 $\Omega$  copper and 120 $\Omega$  nickel RTDs, full or half bridge strain gages; mV, V, 4-20mA or 0-20mA, and wide bandwidth (10kHz) mV and V signals. These modules feature complete signal conditioning functions including 240V rms input protection, filtering, chopper stabilized low drift ( $\pm 1\mu V/^{\circ}C$ ), amplification, 1500V rms isolation, linearization for RTD and thermocouple (with 5B47) inputs and sensor excitation when required. The output module converts a 0 to +5V input to an isolated 4-20mA or 0-20mA process current signal. All modules feature excellent common mode rejection and meet IEEE 472-1974 surge withstand specs.



The 5B Series provides system designers with an easy to use solution for analog I/O in a minimum of board space. The modules' simple pinout and easy mechanical application simplify design.

There are also a number of backplanes which provide a complete signal conditioning solution for end users. Each backplane incorporates screw terminals for field wiring inputs and outputs and cold junction compensation sensors for thermocouple applications. Nineteen-inch relay rack compatible units that can hold up to sixteen modules are available.

**APPLICATIONS**

These signal conditioners are designed to provide an easy and convenient solution to signal conditioning problems of both designers and end users in measurement and control applications. Typical uses include mini- and microcomputer-based measurement systems, standard data acquisition systems, programmable controllers, analog recorders and dedicated control systems. The 5B Series modules are ideally suited to applications where monitoring and control of temperature, pressure, flow and other analog signals are required.

**FM APPROVAL/THE 5B SERIES**

The 5B Series Signal Conditioners are approved by Factory Mutual for use in Class I, Division 2, Groups A, B, C and D locations. This approval certifies that the 5B Series is suitable for use in locations where a hazardous concentration of flammable gas exists only under unlikely conditions of operation. Equipment of this type is called "nonincendive" and needs no special enclosure or other physical safeguards.

## DESIGN FEATURES AND USER BENEFITS

**System Design:** It is easy for system designers to apply the functionally complete 5B Series modules in their own circuit board or backplane. These modules feature a simple pinout, plug into widely available sockets and are secured with self-contained mounting screws. Other features, which can be used to minimize system interface cost, have also been incorporated in the 5B Series design. Each input module has an output switch which is controlled by a TTL-compatible enable input, eliminating the need for an external multiplexer. Each output module has a track and hold input which permits a single DAC to serve numerous current output channels. For thermocouple applications, cold junction compensation sensors are available.

**Subsystem Solution:** The 5B Series provides a complete signal conditioning solution. A family of backplanes, plug-in modules, factory precalibration of each unit, direct sensor interface via screw terminal connections, standardized high level outputs, and ribbon cable system interface result in easy integration into any system. For thermocouple applications, high accuracy cold junction compensation sensing is provided on each channel. A general subsystem application is outlined in Figure 1.

**Flexibility:** The 5B Series can be easily tailored to meet each user's needs. These plug-in signal conditioners can be mixed and matched to provide I/O for various process sensors and actuators. Many standard configurations of each module are available, and, for added flexibility, factory laser trimmed custom units can be supplied. A wide zero suppression capability allows a user to map any portion of the input signal into the full output span permitting improved system resolution within a selected measurement range.

**High Reliability:** The 5B Series was designed to assure maximum reliability under real-world conditions. The modules are specified over the  $-25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  temperature range. Each module is hard potted; there are no adjustment potentiometers which could introduce mechanical and human errors that impair system integrity. All field wired terminations, including sensor inputs, excitations and current outputs, are protected against continuous 240V rms line voltage. This prevents a fault from damaging the module, the backplane or other devices connected to the system. The modules also provide protection against high common-mode



voltages and are designed to meet the IEEE standard for transient voltage protection (472-1974; SWC). Gold plated pin and socket connections are used throughout the system to assure connection reliability.

**High Performance:** The high quality signal conditioning features  $\pm 0.05\%$  calibration accuracy, nonlinearity of only  $\pm 0.02\%$  span and chopper-based amplification which assures low drift ( $\pm 1\mu\text{V}/^{\circ}\text{C}$ ) and excellent long-term stability. Low drift sensor excitation is provided when required, and the RTD and thermocouple modules provide an output which is linear with temperature.

**High Noise Rejection:** The 5B Series modules were designed to accurately process low level signals in electrically noisy environments by providing 1500V rms continuous transformer isolation which eliminates ground loops, protects against transients and solves common-mode voltage problems. To further preserve signal integrity, 160dB common-mode rejection, 60dB normal-mode rejection and excellent RFI/EMI immunity are provided.

**Small Size:** Each 5B Series module measures only  $2.25" \times 2.25" \times 0.60"$  resulting in space savings for both system designers and end users: each module occupies 1.35 square inches of board space and a 16-channel backplane occupies only 3.5 inches in a rack.

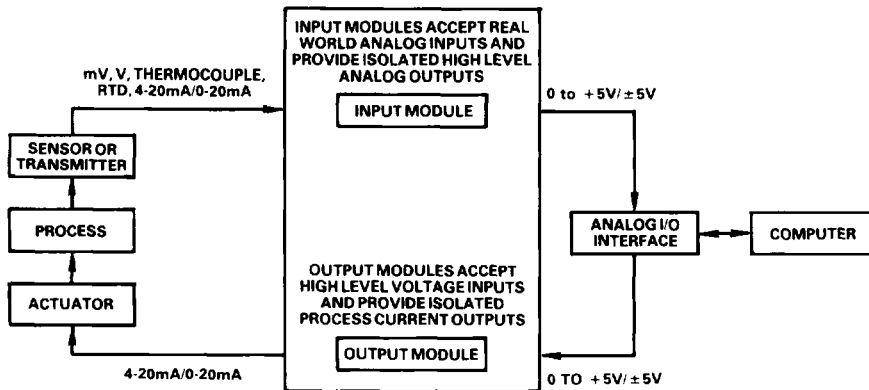
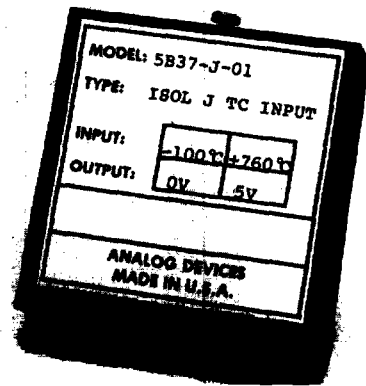


Figure 1. Functional Block Diagram of a General Measurement and Control Application Using the 5B Series

## INPUT MODULE FEATURES

- Variety of Signal Source Inputs
  - Sensors: Thermocouples, RTDs, and Strain Gages
  - Millivolt and Voltage Sources
  - 4-20mA or 0-20mA Process Current Inputs
- Mix and Match Input Capability
- High Level Voltage Output:  $\pm 5V$  or 0 to +5V
- High Accuracy:  $\pm 0.05\%$
- Low Drift:  $\pm 1\mu V/^\circ C$
- Reliable Transformer Isolation: 1500V rms CMV, 160dB CMR, Meets IEEE-STD 472: Transient Protection (SWC)
- Input Protection: 240V rms Continuous
- Factory Ranged and Trimmed, Custom Ranges Available



## GENERAL DESCRIPTION

The galvanically isolated 5B Series input modules are single channel, plug-in signal conditioners that provide input protection, amplification and filtering, series output switching, and a high level analog output. Key specifications include: 1500V rms isolation, accuracy of  $\pm 0.05\%$ ,  $\pm 0.02\%$  span nonlinearity and low drift of  $\pm 1\mu V/^\circ C$ . All modules operate from a single +5V supply with typical power consumption of 0.15W. The modules are hard potted.

The transfer function provided by each input module is:

- Input - specified sensor measurement range
- Output - 0 to +5V or  $\pm 5V$ .

Each 5B Series input module is available in a number of standard ranges, and special ranges can be factory configured. Analog Devices will provide a special function when a model 5B \_\_\_-CUSTOM is ordered with the desired range.

## 5B37 FUNCTIONAL DESCRIPTION

Figure 2 shows a functional diagram for a typical input module, the 5B37 thermocouple conditioner. The module provides cold junction compensation for the associated screw terminals as well as a bias current to give a predictable (upscale) response to an open thermocouple. Input protection allows safe operation even in the event of a 240V rms power line being connected to the signal terminals. (In modules designed to work with sensors requiring excitation, low drift sensor excitation is provided and is protected at the same level.)

A three-pole filter with a 4Hz cutoff provides 60dB of normal-mode rejection and CMR enhancement at 60Hz. One pole of this filter is located at the module input while the other two poles are in the output stage for optimum noise performance. A chopper-stabilized input amplifier provides all of the module's gain for ultralow drift. This amplifier operates on the input signal after subtraction of a stable, laser trimmed zero-suppression signal which sets the zero-scale input value. It is, therefore, possible to suppress a zero-scale input which is many times the total span to provide precise expanded scale measurements.

Signal isolation is provided by transformer coupling, using a proprietary modulation technique for exceptionally linear, stable performance at low cost. A demodulator on the output side of the signal transformer recovers the original signal, which is then filtered and buffered to provide a clean, low impedance output. A series output switch is included to eliminate the need for external multiplexing in many applications. This switch has a low output resistance (50 $\Omega$ ) and is controlled by an active-low enable input which is compatible with CMOS and LSTTL signals. In cases where the output switch is not used, such as single-channel and conventionally multiplexed applications, the enable input should be grounded to power common to turn on the switch.

A single +5V power supply input (as used for all 5B Series modules) operates a clock oscillator which drives power transformers for the input and output circuits. The input circuit is, of course, fully floating. In addition, the output section acts as a third floating port, eliminating many problems that might be created by ground loops and supply noise. The common-mode range of the output circuit is limited; however, output common must be kept within  $\pm 3V$  of power common, and a current path must exist between the two commons at some point for proper operation of the demodulator and output switch.

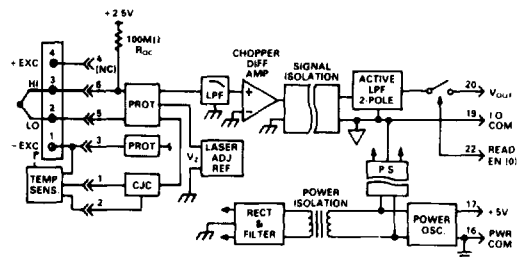


Figure 2. 5B37 Block Diagram

# INPUT MODULE SPECIFICATIONS (typical ( $\alpha$ + 25°C and +5V power))

Model	5B30/5B31	5B32	5B34	5B37/5B47	5B40/5B41	5B38
Input Ranges	dc mV/dc V	Process Current	RTD	Thermocouple	Wideband dc mV/V	300 $\Omega$ to 10k $\Omega$ Bridges
Output Ranges	$\pm 5V$ or 0 to +5V	0 to +5V	0 to -5V	0 to +5V	•	$\pm 5V$
Accuracy <sup>1</sup>	$\pm 0.05\%$ Span	•	•	•	•	•
Nonlinearity	$\pm 0.02\%$ Span	•	0 to 5% Span Conformity	• 0.10% Span	•	•
Stability vs. Ambient Temperature				• NA	•	•
Input Offset	$\pm 1\mu V/^\circ C$ ; 20 $\mu V/^\circ C$	$\pm 0.0025\%$ Span/°C	$\pm 0.02$ C/°C	$\pm 1\mu V/^\circ C$	$\pm 2\mu V/^\circ C$ $\pm 40\mu V/^\circ C$	•
Output Offset	$\pm 20\mu V/^\circ C$	•	•	• NA	•	•
Span	$\pm 25$ ppm of rdg./°C	$\pm 35$ ppm of rdg./°C	$\pm 50$ ppm of rdg./°C	•	•	•
Common-Mode Voltage, Input to Output	1500V rms Continuous	•	•	•	•	•
Common-Mode Rejection <sup>2</sup> 50Hz to 60Hz						
1k $\Omega$ Source Unbalance	160dB/150dB	•	•	•	100dB/90dB	100dB
Normal-Mode Rejection <sup>2</sup> 50Hz or 60Hz	60dB	•	•	•	NA	NA
Differential Input Protection	240V rms Continuous	•	•	•	•	•
Output Resistance	50 $\Omega$	•	•	•	•	•
Voltage Output Protection	Continuous Short to Ground	•	•	•	•	•
Input Transient Protection	Meets IEEE-STD 472 (SWC)	•	•	•	•	•
Input Resistance	5M $\Omega$ /650k $\Omega$	•	•	•	200M $\Omega$ /650k $\Omega$	>20M $\Omega$
Bandwidth	4Hz	•	•	•	10kHz	10kHz
Output Selection Time	20 $\mu s$	•	•	•	•	•
Power Supply	+5V $\pm 5\%$	•	•	•	•	•
Power Consumption	0.15W	•	•	•	•	1W
Size	2.25" $\times$ 2.25" $\times$ 0.6"	•	•	•	•	•
Environmental						
Temperature Range, Rated Performance	-25°C to +85°C	•	•	•	•	•
Temperature Range, Operation	-40°C to +85°C	•	•	•	•	•
Storage Temperature Range	-40°C to +85°C	•	•	•	•	•
Relative Humidity Conforms to	0 to 95% @ 60°C	•	•	•	•	•
MIL Spec 202	Noncondensing	•	•	•	•	•
RFI Susceptibility	$\pm 0.5\%$ Span Error, 5W to 400MHz @ 3"	•	•	•	•	•

## NOTES

<sup>1</sup>Specifications same as 5B30

<sup>2</sup>Accuracy specification includes the combined effects of repeatability, hysteresis and linearity and does not include sensor or signal source error

This specification is for the 5B Series family and may not apply to all ranges of all modules. Consult the 5B Series User's Manual for detailed specifications

Specifications subject to change without notice.

Input Type/Span	Output	Model
dc, $\pm 5mV$ to $\pm 500mV$	$\pm 5V$	5B30, 5B40
dc, $\pm 500mV$ to $\pm 10V$	$\pm 5V$	5B31, 5B41
Process Current, 4-20mA or 0-20mA	0-5V	5B32
Thermocouple Types J, K, T, E, R, S, B	0-5V	5B37/5B47
Linearized Thermocouple Types J, K, T, E, R, S, B	0-5V	5B47
2, 3, 4 Wire RTDs - 100 $\Omega$ Platinum, 10 $\Omega$ Copper, 120 $\Omega$ Nickel	0-5V	5B34
Full and Half Bridge Strain Gages	$\pm 5V$	5B38

Table 1. Input Selection

## ISOLATED MILLIVOLT AND VOLTAGE INPUT MODELS 5B30 AND 5B31

Models 5B30 and 5B31 accept millivolt and voltage signals respectively and have a 4Hz bandwidth.

## ISOLATED CURRENT INPUT MODEL 5B32

Model 5B32 accepts process current signals. A resistor is supplied to convert the signal current to a voltage, and, since that resistor cannot be protected against destruction in the event of inadvertent connection of the power line, it is provided in the form of a separate pluggable resistor carrier assembly. Extra current conversion resistors are available as accessories.

## ISOLATED RTD INPUT MODEL 5B34

This RTD input module provides 3 wire lead resistance compensation and can be connected to 2, 3 or 4 wire RTDs. The

lead resistance effect is  $\pm 0.02^\circ C/\Omega$ . It provides a low drift sensor excitation current of 0.25mA for the 5B34 or 5B34-N or 1.0mA for the 5B34-C and produces an output signal that is linear with temperature with a conformity error of  $\pm 0.05\%$  of span and accuracy of  $\pm 0.05\%$  of span.

## ISOLATED THERMOCOUPLE INPUT MODELS 5B37 AND 5B47

The isolated thermocouple models incorporate cold junction compensation circuitry which provides an accuracy of  $\pm 0.5^\circ C$  over the  $+5^\circ C$  to  $+45^\circ C$  ambient temperature range. Open thermocouple detection (upscale) is also provided. Standard models are available for thermocouple types J, K, T, E, R, S and B. Model 5B47 provides a linearized 0-5V output signal for all thermocouple types.

## ISOLATED WIDEBAND MILLIVOLT AND VOLTAGE INPUT MODELS 5B40 AND 5B41

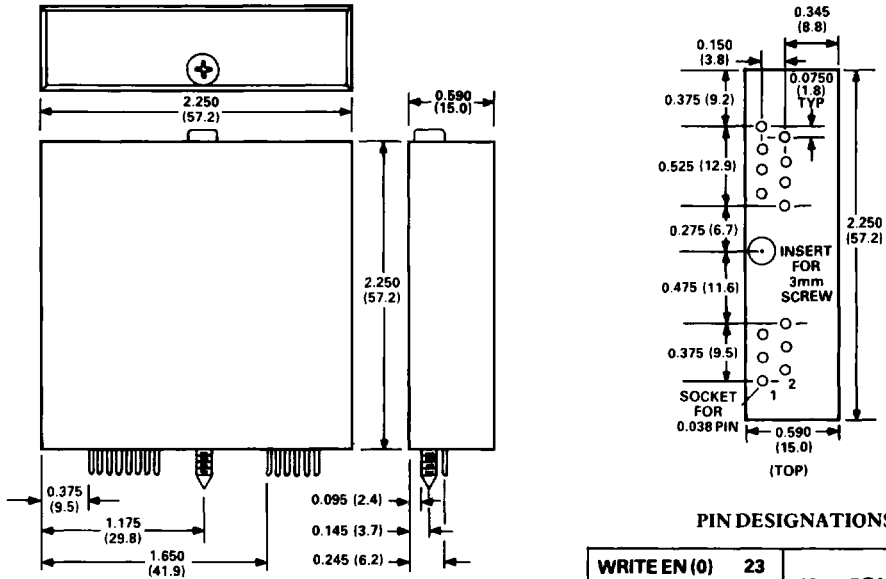
Models 5B40 and 5B41 accept millivolt and voltage signals respectively and have a 10kHz bandwidth for interface to dynamic signals.

## ISOLATED WIDEBAND STRAIN GAGE INPUT MODEL 5B38

The 5B38 accepts signals from full and half bridge 300 $\Omega$  to 10k $\Omega$  transducers. The 5B38 provides +10.0V excitation and provides a -5V to +5V output. This module features a 10kHz bandwidth.

## 5B SERIES MODULE OUTLINE

Dimensions shown in inches and (mm).



## PIN DESIGNATIONS

WRITE EN (0)	23	22	READ EN (0)
RESERVED	21	20	V <sub>OUT</sub>
I/O COM	19	18	V <sub>IN</sub>
+5V	17	16	POWER COM
IN LO	5	6	IN HI
- EXC	3	4	+ EXC
SENSOR -	1	2	SENSOR +

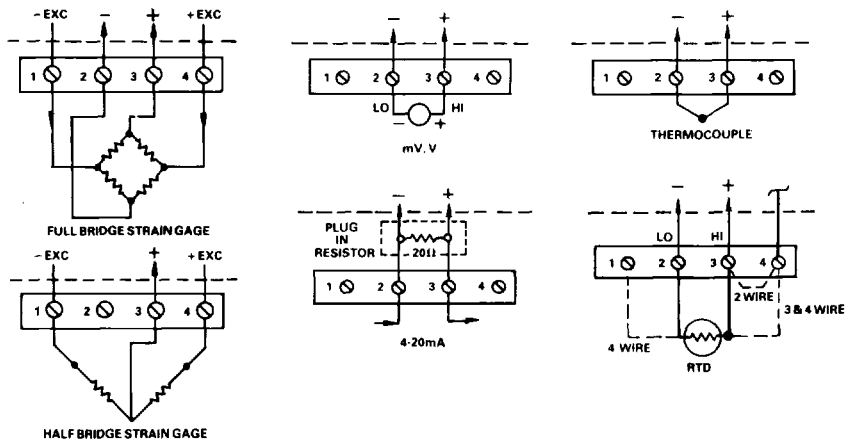


Figure 3. 5B Series Input Connections

### OUTPUT MODULE FEATURES

- **Voltage Input Ranges:** 0 to +5V or  $\pm 5V$
- **Process Current Output:** 4-20mA or 0-20mA
- **High Accuracy:**  $\pm 0.05\%$
- **Reliable Transformer Isolation:** 1500V rms CMV, CMR=90dB
- **Meets IEEE-STD 472: Transient Protection (SWC)**
- **Output Protection:** 240V rms Continuous

### GENERAL DESCRIPTION

The 5B39 Current Output Module accepts a high level analog signal at its input and provides a 4-20mA or 0-20mA process current signal at its output. The module features high accuracy of  $\pm 0.05\%$  and 1500V rms common-mode voltage isolation protection.

The transfer function provided by this module is:

Input - 0 to +5V or  $\pm 5V$   
 Output - 4-20mA or 0-20mA.

To provide this range of functions four varieties of the 5B39 are available; unipolar or bipolar input and output range must be specified when ordering.

### 5B39 FUNCTIONAL DESCRIPTION

Figure 4 is a functional block diagram of the 5B39 current output module. The voltage input, usually from a digital-to-analog converter, is buffered and a quarter scale offset is added if a 4-20mA output is specified.

The signal is latched in a track-and-hold circuit. This track-and-hold allows 1 DAC to serve numerous output channels. The output droop rate is  $80\mu A/s$  which corresponds to a refresh interval for 0.01% FS droop of 25ms. The track-and-hold is controlled by an active-low enable input which is compatible with CMOS and LSTTL signals. In conventional applications where one DAC is used per channel and the track-and-hold is not used, the enable input should be grounded to power common. This keeps the module in tracking mode.

The signal is sent through an isolation barrier to the current output (V-to-I converter) stage. Signal isolation is provided by transformer coupling using a proprietary modulation technique for linear, stable performance at low cost. A demodulator on the output side of the signal transformer recovers the original signal, which is then filtered and converted to a current output. Output protection allows safe operation even in the event of a 240V rms power line being connected to the signal terminals.

A single +5V supply powers a clock oscillator which drives power transformers for the input circuit and the output's high compliance, current loop supply. The output current loop is, of course, fully floating. In addition, the input section acts as a third floating port, eliminating many problems that might be created by ground loops and supply noise. The common-mode range of the input circuit is limited; however, input common must be kept with  $\pm 1V$  of power common, and a current path must exist between the two commons at some point for proper operation of the track-and-hold control input.

## OUTPUT MODULE SPECIFICATIONS

(typical @ +25°C and +5V power)

Input Ranges	0 to +5V or $\pm 5V$
Output Ranges	4-20mA or 0-20mA
Load Resistance Range <sup>1</sup>	0 to 650 $\Omega$
Accuracy <sup>2</sup>	$\pm 0.05\%$ Span
Nonlinearity	$\pm 0.02\%$ Span
Stability vs. Ambient Temperature	
Zero	$\pm 0.5\mu A$
Span	20ppm of Span/ $^{\circ}C$
Common-Mode Voltage, Output to Input and Power Supply	1500V rms Continuous
Common-Mode Rejection	90dB
Normal-Mode Output Protection	240V rms Continuous
Output Transient Protection	Meets IEEE-STD 472 (SWC)
Sample & Hold:	
Output Droop Rate	80 $\mu A/s$
Acquisition Time	50 $\mu s$
Over Range Capability	10%
Maximum Output Under Fault	26mA
Input Resistance	10M $\Omega$
Bandwidth	400Hz
Power Supply	+5V dc $\pm 5\%$
Power Consumption	0.85W (170mA)
Maximum Input Voltage Without Damage	$\pm 10V$
Size	2.25" x 2.25" x 0.6"
Environmental	
Temperature Range, Rated Performance	-25 $^{\circ}C$ to +85 $^{\circ}C$
Storage Temperature Range	-40 $^{\circ}C$ to +85 $^{\circ}C$
Relative Humidity Conforms to MIL Spec 202	
RFI Susceptibility	0 to 95% @ 60 $^{\circ}C$ Noncondensing $\pm 0.5\%$ span error, 5W @ 400MHz @ 3 ft.

#### NOTES

<sup>1</sup>With a minimum power supply voltage of 4.95V,  $R_L$  can be up to 750 $\Omega$ .

<sup>2</sup>Accuracy specification includes the combined effects of repeatability, hysteresis and linearity. Does not include signal source error.

Specifications subject to change without notice.

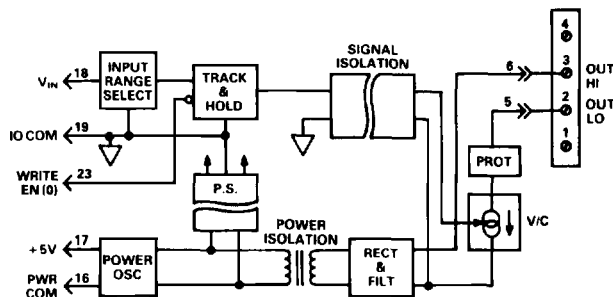


Figure 4. 5B39 Block Diagram

### DESIGNER APPLICATION FEATURES

- Module Pins Fit Widely Available Sockets
- Single Threaded Insert for Module Hold Down
- Cold Junction Compensation Sensors Available
- Input Modules Have Internal Series Output Switches
- Output Modules Have Track-and-Hold Inputs

The *5B Series User's Manual* includes an extensive discussion of system design issues. Design of backplanes which take full advantage of the 5B Series' capabilities by maintaining isolation is emphasized.

### DESIGNER APPLICATION INFORMATION

The 5B Series was designed to facilitate integration by a system designer into his own circuit board or backplane. Only a single 3.0mm threaded insert is required for module hold down. Module pins are accommodated by widely available sockets, and temperature sensors for thermocouple cold junction compensation are available as one-piece precalibrated units.

The 5B Series was also designed to minimize system interface space and cost. Each input module has an internal series output switch which can be controlled by a TTL-compatible enable input eliminating the need for external multiplexers. Each output module has a track-and-hold input which allows a single digital-to-analog converter to serve numerous channels. In applications where it is desirable to do so, the module enable lines can be grounded, and the 5B Series input modules can be used with a conventional external mux and the output modules with a DAC per channel.

Ease of system application of these modules is enhanced by the fact that the output modules have enable and signal input pin assignments which do not coincide with the enable and signal output pins of the input modules, see Figure 5. This means that in a single mix-and-match backplane environment the reading of inputs and the writing and refreshing of outputs are completely independent and occur simultaneously. For example, the input system may dwell for a long time on a single channel to collect thousands of samples without having to interrupt the process to do an output refresh or set a new output value. Similarly, a "dumb" refresh circuit can be built which can maintain outputs without even knowing which channels have output modules; it can refresh all channels, and those that are really inputs will ignore the operation.

### BASIC DESIGN GUIDELINES

Modules may be mounted in any position and will normally be placed next to the screw terminals connecting to the associated field wiring. The temperature sensor is only used by thermocouple modules, but it is normally installed in all channel locations in a "mix-and-match" application. This sensor must be physically close to the terminals where the thermocouple wire connects to copper. Because the low power dissipation of the 5B Series minimizes temperature gradients on the backplane, no special precautions are needed to get accurate temperature sensing. Provision must be made on each channel for the 5B32's current conversion resistor.

The width of the modules is intended to permit installation on 0.6" centers where required, but consideration must be given in each application to the required distance between backplane conductors where large interchannel voltages exist or where code requirements apply. The nature of the screw terminals used for field wiring will also factor in determining practical interchannel spacing.

### OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).

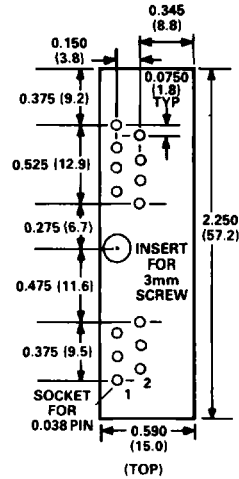


Figure 5. Module Footprint and Pinout

### PIN DESIGNATIONS

WRITE EN (0)	23	22	READ EN (0)
RESERVED	21	20	V <sub>OUT</sub>
I/O COM	19	18	V <sub>IN</sub>
+5V	17	16	POWER COM
		6	IN HI
IN LO	5	4	+ EXC
- EXC	3	2	SENSOR +
SENSOR -	1		

## BACKPLANE FUNCTIONAL DESCRIPTION

To address diverse applications, the 5B Series includes an expanding family of backplanes. Two 16-channel backplanes which can be mounted in a 19" x 3.5" panel space are available. Each channel has four screw terminals for field connections. These connections satisfy all transducer inputs, process current outputs, and provide transducer excitation when necessary. A cold junction sensor is supplied on each channel to accommodate thermocouple modules. A system interface connector provides high level voltage I/O for all channels. Both 5B Series backplanes require a +5V external power source. Other backplanes with integral power supplies are under development.

The 5B Series offers high density packaging to conserve mounting space and can be easily tailored to fit the user's needs. All modules feature universal pin out which assures interchangeability. The screw down design allows easy reconfiguration.

The 5B01, diagrammed in Figure 6, provides sixteen single ended input/output pins on the system connector. It is pin compatible with Analog Devices' 3B Series applications. (Note, however, that 5B Series modules provide a  $\pm 5V$  output swing rather than the  $\pm 10V$  swing provided by 3B Series modules).

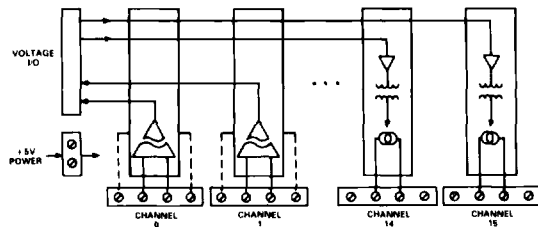


Figure 6. 5B01 Block Diagram

The 5B02, diagrammed in Figure 7, incorporates an input and an output bus which take advantage of the internal series output switches in the input modules and the track-and-holds in the output modules. Designers integrating the 5B02 into a measurement and control system do not need external multiplexers and can use a single digital to analog or analog to digital converter to serve numerous output or input channels.

For smaller applications, the 5B03 and 5B04 module sockets are available for one and two 5B Series modules, respectively. These module sockets may be clustered for groups of three or more signals, and they are DIN rail compatible using Phoenix Universal Module UM elements.

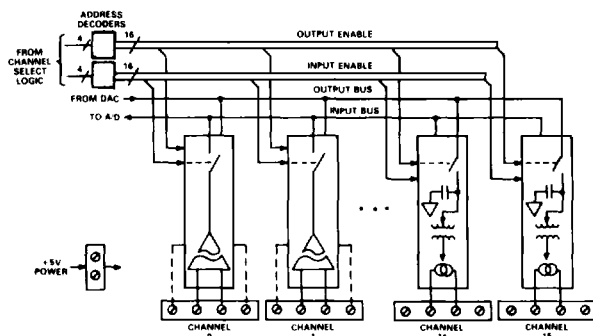


Figure 7. 5B02 Block Diagram

## BACKPLANE SPECIFICATIONS

	5B01, 5B02	5B03/5B04
Channels	16	1, 2
External Power Requirement	+ 5V	*
Cold Junction Sensor	On Each Channel	*
Physical Size	3.5" x 17.4"	4.25" x 1.37"
	88.9mm x 442mm	108mm x 34.7mm

\*Same as 5B01, 5B02.

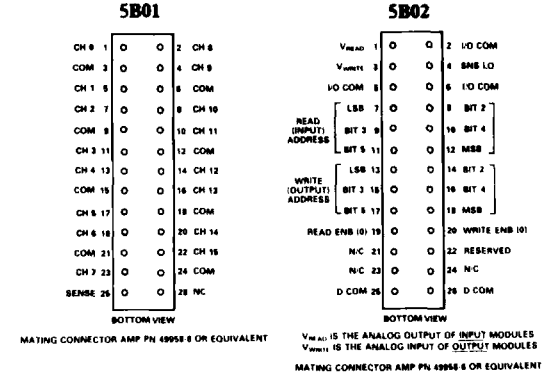


Figure 8. System Connector Pinout

## ACCESSORIES

To ease the board design process for designers and to complete the 5B Series subsystem solution, the following accessories are available.

**CJC Sensors.** SIP temperature sensors are available to provide cold junction temperature measurement for thermocouple applications on user designed backplanes. These sensors are provided on each channel of all backplanes. Model number AC1361.

**Current Conversion Resistors.** Supplied with each 5B32 Current Input Module, a replacement pluggable resistor (20 $\Omega$ ) assembly. Model number AC1362.

**Single Channel Socket.** A single channel test socket with screw terminals and cold junction compensation for module evaluation. DIN rail compatible. Model number AC1360.

**Rack Mount.** A single piece metal chassis for mounting 5B Series backplanes in a 19" rack. Model number AC1363.

**Power Supplies.** Chassis mounted 1A (model number 955), 3A (model number 976) and 5A (model number 977) 5V power supplies are available.

**Cables.** A 2' (60cm) 26-pin cable with two connectors, model number AC1315. For daisy chaining 5B02 backplanes, a 26-pin cable with three connectors, model number CAB-01.

**Interface Board.** A universal interface board with a 26-pin connector in and 26 screw terminals out. Model number AC1324.

**Voltage Switch Input Module.** A nonisolated, unity gain module which allows a preconditioned signal to be connected into the 5B Series backplane. Model number AC1367.