



Rack-Mount I/O Modules

Signal Conditioners

Series overviewPage 196

Backpanels and accessories197

A5B30 DC millivolt input198

A5B31 DC voltage input198

A5B32 DC current input199

A5B37 Thermocouple input200

A5B47 Linearized thermocouple input201

A5B34 RTD input202

A5B38 Strain gage input203

A5B40 Wide bandwidth DC millivolt input204

A5B41 Wide bandwidth DC voltage input204

A5B39 DC current output205

Solid-State Relays

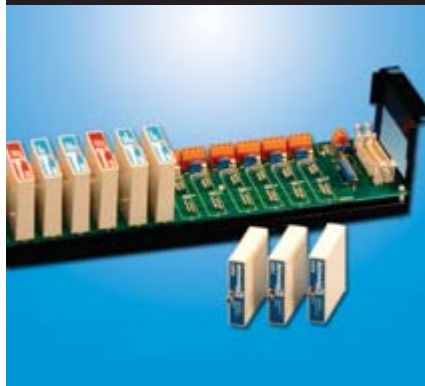
Backpanels and accessoriesPage 206

AC/DC voltage input/output modules206

Technical Documentation

Dimension diagramsPage 207

Analog I/O Modules



Signal conditioning modules provide isolated signals for inputs to A/D cards or outputs from D/A cards.

Digital I/O Modules



Solid-state relays monitor high/low levels and control the on/off status of various discrete devices.

	A5B3x/4x	SSRs
INPUTS		
DC current input	x	
DC millivolt input	x	
Thermocouple input	x	
RTD input	x	
Strain gage input	x	
Relay		x
OUTPUT		
DC voltage	x	
DC current	x	
Relay		x



Input/Output Modules



A5B Series Low-cost Signal Conditioning System

The A5B series provides economical signal conditioning and isolation for inputs to A/D boards and outputs from D/A boards. Plug-in modules feature industry-standard pinouts and fixed I/O ranges (no pot adjustments).

Up to 16 modules plug into a backpanel (multiplexed or non-multiplexed) that is easily mounted in a 19-inch rack. Each A5B module is powered from 5V DC and provides a single channel of isolated analog input or output. Modules are assembled from the highest quality components, encased in thermally conductive hard potting, and subjected to strict testing and quality control.

Analog input modules

Input modules interface to all types of sensors, then filter, isolate, amplify (some models also linearize), and convert to a high-level analog voltage output.

The voltage output is logic switch controlled, which allows these modules to share a common analog bus without the requirement of external multiplexers. If desired, the output switch can be turned on continuously by simply grounding the read-enable pin.

- DC millivolt/voltage
- DC current
- RTD
- Thermocouple types J, K, T, E, R, S, and B
- Linearized thermocouple
- Strain gauge
- Wide-bandwidth millivolt/voltage

Analog output modules

Output modules accept a high-level analog voltage signal from a host system, then buffer, isolate, and amplify before providing a process current output to field devices.

- 4 to 20mA DC
- 0 to 20mA DC

Solid-state plug-in relays

Acromag also offers digital I/O modules for interfacing logic levels in a variety of measurement and control applications.

Special Features

- A six-pole filter provides superior noise rejection to minimize unwanted signal interference
- Low output ripple with no spikes enables more precise measurements
- Isolation eliminates ground loop errors and protects equipment from harmful transient signals
- Industry-standard format ensures compatibility with existing systems
- Economy price helps meet tight budgets



Ordering Information

Backpanels and Accessories

User's Manual

8500-299

A5B User's Manual. Acromag provides (1) manual with first purchase order at NO CHARGE. Additional manuals must be purchased. The first manual must be specified on the purchase order to ensure delivery.

Backpanels

APB01

16-channel, non-multiplexed backpanel. Non-addressable analog I/O signal channels provide each module with its own analog bus. The module output switch is continuously "on" when using this backpanel. A temperature sensor is mounted on each channel to provide cold junction compensation for thermocouple modules. Field connections are terminated with four screw terminals at each module site.

APB02

16-channel, multiplexed backpanel. Has two analog buses; one for input, one for output. Two-bus configuration takes advantage of the switch-controlled outputs on the input modules and the track-and-hold inputs on the output modules. Up to four APB02 backpanels can be daisy-chained. Includes temperature sensor and four screw terminals at each module site.

APB03

Single channel, non-multiplexed backpanel. See tables below for additional parts required.

APB04

Dual channel, non-multiplexed backpanel. See tables below for additional parts required.

The following parts are required for DIN rail mounting of one APB03 or APB04 backpanel:

Quantity	Part No.	Description
1	UM-BEFE35	Base element with snap foot
2	UM-SE	Side element

The following parts are required to DIN rail mount two or more APB03 or APB04 backpanels:

Quantity	Part No.	Description
2	UM-BEFE35	Base element with snap foot
2	UM-SE	Side element
Note 1	UM-BE35	Base element w/o snap foot
Note 2	UM-VS	Connection pin

Note 1: Quantity = # of panels - 2

Note 2: Quantity = 4 x (# of panels - 2)

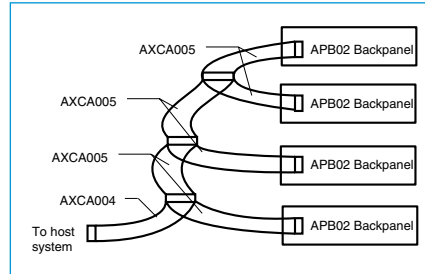
Cables

AXCA004-xx

Interface cable for host system connection. General-purpose 26 conductor ribbon cable for use with APB01/02 backpanels. Specify length, -xx, in feet when ordering.

AXCA005

Daisy-chain cable, interconnects up to four APB02 backpanels.



Power Supplies

AXPRT-003

Power supply, 120V AC input (104 to 132V range).

AXPRE-003

Power supply, 220V AC input (207 to 265V range).

Interface Accessories

AXEV

Evaluation board (single channel) with a test socket. See table below for additional parts required.

The following parts are required for DIN rail mounting of one AXEV evaluation board:

Quantity	Part No.	Description
2	UM-BEFE35	Base element with snap foot
2	UM-SE	Side element
4	UM-VS	Connection pin

AXIF

Universal interface board. Converts a 26-pin ribbon cable to 26 screw terminals for discrete wire. Mounts on AXRK-002 rack (standoffs, mounting hardware included). Use AXCA004 cable.

AVMEIF

VMEbus interface board, 32 inputs. Interfaces APB01 backpanel with a 26-pin ribbon cable to Acromag VME A/D boards.

Mounting Accessories

AXRK-002

19-inch metal rack for mounting the backpanels, power supplies, and universal interface board.

UM-BEFE 35

Base element with snap foot (for DIN rail mounting).

UM-BE 35

Base element without snap foot (for DIN rail mounting).

UM-SE

Side element (for DIN rail mounting).

UM-VS

Connection pin (for DIN rail mounting).

Miscellaneous Accessories

AXFS-003

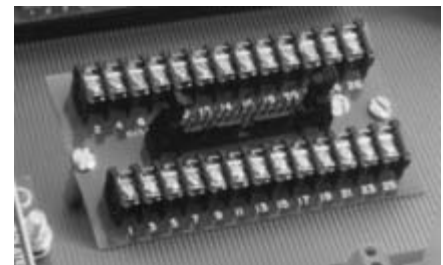
Fuses for backpanel, 4 amp, package of 10.

AXJP-003

Jumper strap, package of 10 jumpers. Connects I/O modules to direct the output of any input module to the adjacent output module on the APB01 backpanel. The jumpers can also be used to configure I/O addresses on APB02 backpanel.

AXR1

Current conversion resistor (precision 20 ohm 0.1%) for A5B32 current input module. Sockets are provided on APB01/02.



AXIF interface board



Input Modules



A5B30/31 Units DC Millivolt and Voltage Input

A5B30/31 modules plug into a backpanel to provide a single channel of analog input which is filtered, isolated, amplified, and converted to a proportional DC voltage output signal.

Signal filtering is accomplished with a six-pole filter. Two poles of this filter are on the field side of the isolation barrier and the other four are in the output stage. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

Ordering Information

Model	Input	Output
A5B30-01	DC mV input	-10 to 10mV
A5B30-02	DC mV input	-50 to 50mV
A5B30-03	DC mV input	-100 to 100mV
A5B30-04	DC mV input	-10 to 10mV
A5B30-05	DC mV input	-50 to 50mV
A5B30-06	DC mV input	-100 to 100mV
A5B31-01	DC voltage in	-1 to 1V
A5B31-02	DC voltage in	-5 to 5V
A5B31-03	DC voltage in	-10 to 10V
A5B31-04	DC voltage in	-1 to 1V
A5B31-05	DC voltage in	-5 to 5V
A5B31-06	DC voltage in	-10 to 10V

Performance

Input Range

A5B30: $\pm 10\text{mV}$ to $\pm 100\text{mV}$
A5B31: $\pm 1\text{V}$ to $\pm 10\text{V}$

Input Bias Current

A5B30: $\pm 0.5\text{nA}$
A5B31: $\pm 0.05\text{nA}$

Input Resistance

Normal A5B30: 50M ohms
Normal A5B31: 650K ohms

Power Off A5B30: 40K ohms
Power Off A5B31: 650K ohms

Overload A5B30: 40K ohms
Overload A5B31: 650K ohms

Input Protection

Continuous: 240V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMV, Input to Output

Continuous: 1500V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)
160dB

NMR

95dB @ 60Hz, 90dB @ 50Hz

Accuracy

A5B30:
 $\pm 0.05\%$ (0.08% max)

A5B31:
 $\pm 0.05\%$ (0.08% max)

Nonlinearity

$\pm 0.02\%$ Span ($\pm 0.035\%$ Max)

Stability

Input Offset A5B30: $\pm 1\mu\text{V}/^\circ\text{C}$ ($\pm 2\mu\text{V}/^\circ\text{C}$ max)
Input Offset A5B31: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 25\mu\text{V}/^\circ\text{C}$ max)

Output Offset A5B30: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 30\mu\text{V}/^\circ\text{C}$ max)
Output Offset A5B31: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 30\mu\text{V}/^\circ\text{C}$ max)

Gain A5B30: $\pm 25\text{ppm}/^\circ\text{C}$ ($\pm 50\text{ppm}/^\circ\text{C}$ max)
Gain A5B31: $\pm 50\text{ppm}/^\circ\text{C}$ ($\pm 70\text{ppm}/^\circ\text{C}$ max)

Noise

Input, 0.1 to 10Hz A5B30: 0.2 μVRMS (0.6 μVRMS max)
Input, 0.1 to 10Hz A5B31: 2 μVRMS (3 μVRMS max)

Output, 100KHz A5B30: 200 μVRMS (400 μVRMS , 800 $\mu\text{VP-P}$ max)

Output, 100KHz A5B31: 200 μVRMS (400 μVRMS , 800 $\mu\text{VP-P}$ max)

Bandwidth, -3dB

4Hz

Response Time, 90% span

200ms

Output Resistance

50 ohms

Output Protection

Continuous short to ground

Output Selection Time, (to $\pm 1\text{mV}$ of V_{out})

2.5 μs @ 200pF, 3.5 μs @ 500pF,
4.0 μs @ 1000pF, 6.0 μs @ 2000pF

Output Enable Control

Max Logic "0": +0.8V
Min Logic "1": +2.4V
Max Logic "1": +36V
Input Current, "0, 1": 0.5 μA

Power Supply Voltage

+5V DC $\pm 5\%$

Power Supply Current

30mA Max

Environmental

Operating Temperature Range: -40 to +85°C

Storage Temperature Range: -40 to +85°C

Relative Humidity: 0 to 95% noncondensing

RFI Susceptibility: $\pm 0.5\%$ span error @ 400MHz, 5W, 3 ft

Approvals (CSA, FM)

Class I; Division 2; Groups A, B, C, D.



Input Modules



A5B32 Units

DC Current Input

A5B32 modules plug into a backpanel to provide a single channel of analog input which is filtered, isolated, amplified, and converted to a proportional high-level DC voltage output signal.

Signal filtering is accomplished with a six-pole filter. Two poles of this filter are on the field side of the isolation barrier and the other four are in the output stage. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

A precision 20 ohm current conversion resistor is supplied with the module. Extra resistors (AXR1) can be ordered.

Ordering Information

Model	Input	Output
A5B32-01	DC mA input	4 to 20mA
A5B32-02	DC mA input	0 to 20mA

Accessories

AXR1

Current conversion resistor (precision 20 ohm 0.1%)

Performance

Input Range

0 to 20mA or 4 to 20mA

Input Resistor (Current Sense Resistor)

Value: 20 ohms

Accuracy: $\pm 0.1\%$

Stability: $\pm 10\text{ppm}/^\circ\text{C}$

Input Protection

Continuous: 240V_{RMS} max

Transient: ANSI/IEEE C37.90.1-1989

CMV, Input to Output

Continuous: 1500V_{RMS} max

Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)

160dB

NMR

95dB @ 60Hz, 90dB @ 50Hz

Accuracy

$\pm 0.05\%$ Span ($\pm 0.08\%$ max)

Nonlinearity

$\pm 0.02\%$ Span ($\pm 0.035\%$ max)

Stability

Input Offset: $\pm 1\mu\text{V}/^\circ\text{C}$ ($\pm 2\mu\text{V}/^\circ\text{C}$ max)

Output Offset: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 30\mu\text{V}/^\circ\text{C}$ max)

Gain: $\pm 25\text{ppm}/^\circ\text{C}$ ($\pm 50\text{ppm}/^\circ\text{C}$ max) of reading

$\pm 10\text{ppm}$ for Resistor

Noise

Input, 0.1 to 10Hz: 10nA rms (20nA_{RMS} max)

Output, 100KHz: 200 μV _{RMS} (400 μV _{RMS}, 800 μV _{P-P} max)

Bandwidth, -3dB

4Hz

Response Time, 90% span

200mS

Output Range

0 to +5V

Output Resistance

50 ohms

Output Protection

Continuous short to ground

Output Selection Time, (to $\pm 1\text{mV}$ of V_{OUT})

2.5 μS @ 200pF, 3.5 μS @ 500pF,

4.0 μS @ 1000pF, 6.0 μS @ 2000pF

Output Enable Control

Max Logic "0": +0.8V

Min Logic "1": +2.4V

Max Logic "1": +36V

Input Current, "0, 1": 0.5 μA

Power Supply Voltage

+5VDC $\pm 5\%$

Power Supply Current

30mA max

Power Supply Sensitivity

$\pm 2\mu\text{V}/\%$

Environmental

Operating Temperature Range: -40 to 85°C

Storage Temperature Range: -40 to 85°C

Relative Humidity: 0 to 95% noncondensing

RFI Susceptibility: $\pm 0.5\%$ span error @ 400MHz, 5W, 3 ft.

Approvals (CSA, FM)

Class I; Division 2; Groups A, B, C, D.



Input Modules



A5B37 Units Thermocouple Input

A5B37 modules plug into a backpanel to provide a single channel of analog input which is filtered, isolated, amplified, and converted to a proportional DC voltage output signal.

Each module is cold junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and the screw terminals on the mounting backpanel. Upscale open thermocouple detect is provided by an internal pull-up resistor.

Signal filtering is accomplished with a six-pole filter. Two poles of this filter are on the field side of the isolation barrier and the other four are in the output stage. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

Ordering Information

Model	Input	Output
A5B37J Type J input	-100 to 760°C	0 to 5V DC
A5B37K Type K input	-100 to 1350°C	0 to 5V DC
A5B37T Type T input	-100 to 400°C	0 to 5V DC
A5B37E Type E input	0 to 900°C	0 to 5V DC
A5B37R Type R input	0 to 1750°C	0 to 5V DC
A5B37S Type S input	0 to 1750°C	0 to 5V DC
A5B37B Type B input	0 to 1800°C	0 to 5V DC

Performance

Input Range
±5mV to ±0.5V

Input Bias Current
-25nA

Input Resistance
Normal: 50M ohms
Power Off: 40K ohms
Overload: 40K ohms

Input Protection
Continuous: 240VRMS max
Transient: ANSI/IEEE C37.90.1-1989

CMV, Input to Output
Continuous: 1500VRMS max
Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)
160dB

NMR
95dB @ 60Hz, 90dB @ 50Hz

Accuracy
±0.05% Span (0.08% max) ±10μV

Nonlinearity
±0.02% span (±0.035% Max)

Stability
Input Offset: ±1μV/°C (±2μV/°C max)
Output Offset: ±20μV/°C (±30μV/°C max)
Gain: ±25ppm/°C (±50ppm/°C max)

Noise
Input, 0.1 to 10Hz: 0.2μVRMS (0.6μVRMS max)
Output, 100KHz: 200μVRMS (400μVRMS, 800μVp-p max)

Bandwidth, -3dB
4Hz

Response Time, 90% span
200ms

Output Range
0 to +5V

Output Resistance
50 ohms

Output Protection
Continuous Short to Ground

Output Selection Time, (to ±1mV of Vout)
2.5μS @ 200pF, 3.5μS @ 500pF,
4.0μS @ 1000pF, 6.0μS @ 2000pF

Output Enable Control
Max Logic "0": +0.8V
Min Logic "1": +2.4V
Max Logic "1": +36V
Input Current, "0, 1": 0.5μA

Open Input Response
Upscale

Open Input Detection Time
1S

Cold Junction Compensation
Accuracy, 25°C: ±0.25°C
Accuracy, 5 to 45°C: ±0.5°C
Accuracy, -25 to 85°C: ±1.0°C, typ., ±1.5°C max.

Power Supply Voltage
+5V DC ±5%

Power Supply Current
30mA Max

Environmental
Operating Temperature Range: -40 to +85°C
Storage Temperature Range: -40 to +85°C
Relative Humidity: 0 to 95% noncondensing
RFI Susceptibility: ±0.5% span error @ 400MHz, 5W,
3 ft

Approvals (CSA, FM)
Class I; Division 2; Groups A, B, C, D.



Input Modules



A5B47 Units Linearized Thermocouple Input

A5B47 modules plug into a backpanel to provide a single channel of analog input which is linearized, filtered, isolated, amplified, and converted to a proportional DC voltage output signal.

These input modules are similar to the A5B37 modules, but add thermocouple signal linearization. Each module is cold junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and the screw terminals on the mounting backpanel. Upscale open thermocouple detect is provided by an internal pull-up resistor.

Ordering Information

Model	Input	Output
A5B47J-01	Lin. Type J input 0 to 760°C	0 to 5V DC
A5B47J-02	Lin. Type J input -100 to 300°C	0 to 5V DC
A5B47J-03	Lin. Type J input 0 to 500°C	0 to 5V DC
A5B47K-04	Lin. Type K input 0 to 1000°C	0 to 5V DC
A5B47K-05	Lin. Type K input 0 to 500°C	0 to 5V DC
A5B47T-06	Lin. Type T input -100 to 400°C	0 to 5V DC
A5B47T-07	Lin. Type T input 0 to 200°C	0 to 5V DC
A5B47E-08	Lin. Type E input 0 to 1000°C	0 to 5V DC
A5B47R-09	Lin. Type R input 500 to 1750°C	0 to 5V DC
A5B47S-10	Lin. Type S input 500 to 1750°C	0 to 5V DC
A5B47B-11	Lin. Type B input 500 to 1800°C	0 to 5V DC

Performance

Input Range
±5mV to ±0.5V

Input Bias Current
-25nA

Input Resistance
Normal: 50M ohms
Power Off: 40K ohms
Overload: 40K ohms

Input Protection
Continuous: 240V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMV, Input to Output
Continuous: 1500V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)
160dB

NMR
95dB @ 60Hz, 90dB @ 50Hz

Accuracy

A5B47J-01: ±0.76°C	A5B47T-07: ±0.30°C
A5B47J-02: ±0.40°C	A5B47E-08: ±1.5°C
A5B47J-03: ±0.36°C	A5B47R-09: ±1.6°C
A5B47K-04: ±1.0°C	A5B47S-10: ±1.5°C
A5B47K-05: ±0.38°C	A5B47B-11: ±3.3°C
A5B47T-06: ±1.1°C	

Stability

Input Offset: ±1μV/°C* (±2μV/°C max)
Output Offset: ±20μV/°C (±30μV/°C max)
Gain: ±25ppm/°C (±50ppm/°C max)

Noise

Input, 0.1 to 10Hz: 0.2μV_{RMS} (0.6μV_{RMS} max)
Output, 100KHz: 150μV_{RMS} (300μV_{RMS}, 800μV_{P-P} max)

Bandwidth, -3dB

4Hz

Response Time, 90% span
200mS

Output Resistance

50 ohms

Output Protection

Continuous short to ground

Output Selection Time, (to ±1mV of V_{out})

2.5μS @ 200pF, 3.5μS @ 500pF,
4.0μS @ 1000pF, 6.0μS @ 2000pF

Output Enable Control

Max Logic "0": +0.8V
Min Logic "1": +2.4V
Max Logic "1": +36V
Input Current, "0, 1": 0.5μA

Open Input Response

Upscale

Open Input Detection Time

1S

Cold Junction Compensation

Accuracy, 25°C: ±0.25°C
Accuracy, 5 to 45°C: ±0.5°C
Accuracy, -25 to 85°C: ±1.0°C, typical, ±1.5°C max.

Power Supply Voltage

+5V DC ±5%

Power Supply Current

30mA max

Environmental

Operating Temperature Range: -40 to +85°C
Storage Temperature Range: -40 to +85°C
Relative Humidity: 0 to 95% noncondensing
RFI Susceptibility: ±0.5% span error @ 400MHz, 5W, 3 ft

Approvals (CSA, FM)

Class I; Division 2; Groups A, B, C, D.

NOTES

* This is equivalent to °C as follows:

Type J: 0.020°C/°C Type E: 0.016°C/°C
Type K: 0.025°C/°C Type R,S: 0.168°C/°C



Input Modules



A5B34 Units RTD Input

A5B34 modules plug into a backpanel to provide a single channel of analog input which is filtered, isolated, amplified, linearized, and converted to a proportional DC voltage output signal.

RTD excitation is provided from the module by two matched current sources. When using a three-wire RTD, this method allows an equal current to flow in each RTD lead, which cancels the effects of lead resistances. The excitation currents are very small which minimizes self-heating on the RTD.

Signal filtering is accomplished with a six-pole filter. Two poles of this filter are on the field side of the isolation barrier and the other four are in the output stage. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

Ordering Information

Model	Input	Output		
A5B34-01	Pt RTD input	-100 to 100°C	0 to 5V DC	
A5B34-02	Pt RTD input	0 to 100°C	0 to 5V DC	
A5B34-03	Pt RTD input	0 to 200°C	0 to 5V DC	
A5B34-04	Pt RTD input	0 to 600°C	0 to 5V DC	
A5B34C-01	Cu RTD input	10 ohms @ 0°C	0 to 120°C	0 to 5V DC
A5B34C-02	Cu RTD input	10 ohms @ 25°C	0 to 120°C	0 to 5V DC
A5B34N-01	Ni RTD input	0 to 300°C	0 to 5V DC	

Performance

Input Range
-200 to 850°C (100 ohm Pt)

Input Resistance
Normal: 50M ohms
Power Off: 40K ohms
Overload: 40K ohms

Sensor Excitation Current
100 ohm Pt, 120 ohm Ni: 0.25mA
10 ohm Cu: ±1.0mA

Input Protection
Continuous: 240V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMV, Input to Output
Continuous: 1500V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)
160dB

NMR
95dB @ 60Hz, 90dB @ 50Hz

Accuracy

A5B34-01: ±0.43°C	A5B34C-01: ±0.82°C
A5B34-02: ±0.44°C	A5B34C-02: ±0.84°C
A5B34-03: ±0.50°C	A5B34N-01: ±0.30°C
A5B34-04: ±0.72°C	

Conformity Error
±0.05% span

Stability
Input Offset: ±0.02°C/°C (±0.04°C/°C max)
Output Offset: ±20µV/°C (±30µV/°C max)
Gain: ±50ppm of reading/°C max

Noise
Input, 0.1 to 10Hz: 0.2µV_{RMS} (0.6µV_{RMS} max)
Output, 100KHz: 200µV_{RMS} (400µV_{RMS}, 800µV_{P-P} max)

Bandwidth, -3dB
4Hz

Response Time, 90% span
200ms

Output Range
0 to +5V

Output Resistance
50 ohms

Output Protection
Continuous short to ground

Output Selection Time, (to ±1mV of V_{out})
2.5µs @ 200pF, 3.5µs @ 500pF,
4.0µs @ 1000pF, 6.0µs @ 2000pF

Output Enable Control
Max Logic "0": +0.8V
Min Logic "1": +2.4V
Max Logic "1": +36V
Input Current, "0, 1": 0.5µA

Power Supply Voltage
+5V DC ±5%

Power Supply Current
30mA (33mA max)

Power Supply Sensitivity
100 ohm Pt, 120 ohm Ni: 0.05°C/V
10 ohm Cu: 0.5°C/V

Environmental
Operating Temperature Range: -40 to +85°C
Storage Temperature Range: -40 to +85°C
Relative Humidity: 0 to 95% noncondensing
RFI Susceptibility: ±0.5% span error @ 400MHz, 5W, 3 ft

Approvals (CSA, FM)
Class I; Division 2; Groups A, B, C, D.

NOTES
* Use ±0.025Ω when using Cu RTDs. R_Z is the value of the RTD resistance at the lowest point of measurement range. RTI is Referred To Input.



Input Modules



A5B38 Units

Strain Gage Input

A5B38 modules plug into a backpanel to provide a single channel of analog input which is filtered, isolated, amplified, and converted to a proportional DC voltage output signal.

The A5B38 can interface to full-bridge or half-bridge transducers that have a resistance range from 300 to 10K ohms. A matched pair of bridge-completion resistors (to +1mV) allows use of low cost half-bridge transducers. The 10KHz bandwidth enables measurement of high speed processes, such as vibration analysis.

Signal filtering is accomplished with an anti-aliasing filter. Two poles of this filter are on the field side of the isolation barrier and the other four are in the output stage. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

Ordering Information

Model	Input	Output
A5B38-02 Full-bridge 300 to 10K ohm input	10.0V at 3mV/V sensitivity	-5 to 5V DC
A5B38-04 Half-bridge 300 to 10K ohm input	10.0V at 3mV/V sensitivity	-5 to 5V DC
A5B38-05 Full-bridge 300 to 10K ohm input	10.0V at 2mV/V sensitivity	-5 to 5V DC

Performance

- Input Range**
A5B38-02, -05: $\pm 30\text{mV}$ @ 3mV/V sensitivity, $\pm 20\text{mV}$ @ 2mV/V sensitivity
A5B38-04: $\pm 30\text{mV}$ @ 3mV/V sensitivity
- Input Bias Current**
-0.3nA
- Input Resistance**
Normal: 50M ohms
Power Off: 40K ohms
Overload: 40K ohms
- Excitation Output V, 300 ohm Load**
10V $\pm 3\text{mV}$
- Excitation Load Regulation**
 $\pm 5\text{ppm/mA}$
- Excitation Stability**
 $\pm 15\text{ppm}/^\circ\text{C}$
- Half-Bridge, Voltage Level**
A5B38-04: (Excitation V/2) $\pm 1\text{mV}$
- Input Protection**
Continuous: 240V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989
- CMV, Input to Output**
Continuous: 1500V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989
- CMR (50 or 60Hz)**
100dB
- NMR**
120dB per decade (frequency > 10KHz)

Accuracy
A5B38-02, -05: $\pm 0.08\%$ span $\pm 10\mu\text{V}$
A5B38-04: $\pm 0.08\%$ span $\pm 1\text{mV}$

Nonlinearity
 $\pm 0.02\%$ span

Stability
Input Offset: $\pm 1\mu\text{V}/^\circ\text{C}$
Output Offset: $\pm 40\mu\text{V}/^\circ\text{C}$
Gain: $\pm 25\text{ppm}$ of reading/ $^\circ\text{C}$

Noise
A5B38-02, -05: (Input, 10Hz) 0.4 μV_{RMS}
A5B38-04: (Input, 10Hz) 2 μV_{RMS}
A5B38-02, -05: (Input, 10KHz) $\pm 70\text{nV}/\sqrt{\text{Hz}}$
A5B38-04: (Input, 10KHz) $\pm 250\text{nV}/\sqrt{\text{Hz}}$
A5B38-02, -05: (Input, 100KHz) 10mV_{P-P}
A5B38-04: (Input, 100KHz) 10mV_{P-P}

Bandwidth, -3dB
10KHz

Rise Time, 10 to 90% span
40 μs

Settling Time, to 0.1%
A5B38-02, -05: 250 μs
A5B38-04: 7mS

Output Resistance
50 ohms

Output Protection
Continuous short to ground

Output Selection Time, (to $\pm 1\text{mV}$ of Vout)
2.5 μs @ 200pF, 3.5 μs @ 500pF,
4.0 μs @ 1000pF, 6.0 μs @ 2000pF

Output Enable Control
Max Logic "0": +0.8V
Min Logic "1": +2.4V
Max Logic "1": +36V
Input Current, "0, 1": 0.5 μA

Power Supply Voltage
+5VDC $\pm 5\%$

Power Supply Current
170mA full load, 70mA no load

Environmental
Operating Temperature Range: -40 to 85 $^\circ\text{C}$
Storage Temperature Range: -40 to 85 $^\circ\text{C}$
Relative Humidity: 0 to 95% noncondensing
RFI Suscept.: $\pm 0.5\%$ span error @ 400MHz, 5W, 3ft.

Approvals (CSA, FM)
Class I; Division 2; Groups A, B, C, D.



Input Modules



A5B40/41 Units Wide-bandwidth Millivolt and Voltage Input

A5B40/41 modules plug into a backpanel to provide a single channel of analog input which is isolated, amplified, and converted to a proportional DC voltage output signal.

The input signal is processed through a preamplifier on the field side of the isolation barrier. This preamplifier has a gain-bandwidth product of 5MHz and is bandwidth limited to 10KHz. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

Ordering Information

Model	Input	Output
A5B40-01	DC mV input	-10 to 10mV
A5B40-02	DC mV input	-50 to 50mV
A5B40-03	DC mV input	-100 to 100mV
A5B40-04	DC mV input	-10 to 10mV
A5B40-05	DC mV input	-50 to 50mV
A5B40-06	DC mV input	-100 to 100mV
A5B41-01	DC voltage in	-1 to 1V
A5B41-02	DC voltage in	-5 to 5V
A5B41-03	DC voltage in	-10 to 10V
A5B41-04	DC voltage in	-1 to 1V
A5B41-05	DC voltage in	-5 to 5V
A5B41-06	DC voltage in	-10 to 10V

Performance

Input Range

A5B40: $\pm 10\text{mV}$ to $\pm 100\text{mV}$
A5B41: $\pm 1\text{V}$ to $\pm 10\text{V}$

Input Bias Current

A5B40: $\pm 0.5\text{nA}$
A5B41: $\pm 0.05\text{nA}$

Input Resistance

Normal A5B40: 200M ohms
Normal A5B41: 650K ohms

Power Off A5B40: 40K ohms
Power Off A5B41: 650K ohms

Overload A5B40: 40K ohms
Overload A5B41: 650K ohms

Input Protection

Continuous: 240V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMV, Input to Output

Continuous: 1500V_{RMS} max
Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)

A5B40: 100dB
A5B41: 90dB

NMR

-3dB at 10KHz, 120dB per decade above 10KHz

Accuracy

A5B40:
 $\pm 0.05\%$ (0.08% max) Span $\pm 10\mu\text{V}$ RTI $\pm 0.05\%$ (V_Z)*
A5B41:
 $\pm 0.05\%$ (0.08% max) Span $\pm 0.2\text{mV}$ RTI $\pm 0.05\%$ (V_Z)*

Nonlinearity

$\pm 0.02\%$ Span ($\pm 0.035\%$ Max)

Stability

Input Offset A5B40: $\pm 1\mu\text{V}/^\circ\text{C}$ ($\pm 2\mu\text{V}/^\circ\text{C}$ max)
Input Offset A5B41: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 25\mu\text{V}/^\circ\text{C}$ max)
Output Offset A5B40: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 30\mu\text{V}/^\circ\text{C}$ max)
Output Offset A5B41: $\pm 20\mu\text{V}/^\circ\text{C}$ ($\pm 30\mu\text{V}/^\circ\text{C}$ max)
Gain A5B40: $\pm 25\text{ppm}/^\circ\text{C}$ ($\pm 50\text{ppm}/^\circ\text{C}$ max)
Gain A5B41: $\pm 50\text{ppm}/^\circ\text{C}$ ($\pm 70\text{ppm}/^\circ\text{C}$ max)

Noise

A5B40 Input, 0.1 to 10Hz: 0.4 μVRMS (1 μVRMS max)
A5B41 Input, 0.1 to 10Hz: 2 μVRMS (4 μVRMS max)
A5B40 Output, V_{IN} = Full Scale: 20mV_{P-P} max
A5B41 Output, V_{IN} = Full Scale: 30mV_{P-P} max
Output, V_{IN} = 0V: 10mV_{P-P}

Bandwidth, -3dB

10KHz

Rise Time, 10 to 90% span

35 μs

Output Range

$\pm 5\text{V}$ or 0 to +5V

Output Resistance

50 ohms

Output Protection

Continuous short to ground

Output Selection Time, (to $\pm 1\text{mV}$ of V_{out})

2.5 μs @ 200pF, 3.5 μs @ 500pF,
4.0 μs @ 1000pF, 6.0 μs @ 2000pF

Output Enable Control

Max Logic "0": +0.8V
Min Logic "1": +2.4V
Max Logic "1": +36V
Input Current, "0, 1": 0.5 μA

Power Supply Voltage

+5V DC $\pm 5\%$

Power Supply Current

30mA (33mA max)

Power Supply Sensitivity

A5B40: $\pm 2\mu\text{V}/\%$ (RTI)
A5B41: $\pm 200\mu\text{V}/\%$ (RTI)

Environmental

Operating Temperature Range: -40 to +85°C
Storage Temperature Range: -40 to +85°C
Relative Humidity: 0 to 95% noncondensing
RFI Susceptibility: $\pm 0.5\%$ span error @ 400MHz, 5W,
3 ft

Approvals (CSA, FM)

Class I; Division 2; Groups A, B, C, D.

NOTES

* V_Z is the input voltage that results in 0V output.
RTI is Referred To Input.



Output Modules



A5B39 Units DC Current Output

A5B39 modules plug into a backpanel to provide a single channel of analog output. Input signals are buffered, isolated, filtered, and converted to a proportional DC current output signal.

The A5B39 has a track-and-hold circuit in the input stage which can be operated in a hold mode where one D/A converter can supply many output modules, or a track mode where one D/A converter is dedicated to each module.

Setting of the track or hold mode is controlled by the logic state of WR/EN. The APB02 backpanel allows host computer control of the WR EN control line, which allows multiplexing of one host D/A converter to up to sixty-four A5B39 output modules. During power up, the output remains at 0mA for 100mS, enabling the track-and-hold circuit to be initialized.

Ordering Information

Model	Input	Output
A5B39-01	Current Output 0 to 5V DC	4 to 20mA
A5B39-02	Current Output -5 to 5V DC	4 to 20mA
A5B39-03	Current Output 0 to 5V DC	0 to 20mA
A5B39-04	Current Output -5 to 5V DC	0 to 20mA

Performance

Input Voltage Range
±5V or 0 to 5V

Input Voltage Maximum
±36V (no damage)

Input Resistance
50M ohms

Output Current Range
0 to 20mA or 4 to 20mA

Over Range Capability
10%

Load Resistance Range
0 to 650 ohms (0 to 750 ohms for supply voltage greater than 4.95V DC)

Output Current Under Fault, Max.
26mA

Output Protection
Continuous: 240VRMS max
Transient: ANSI/IEEE C37.90.1-1989

CMV, Output to Input
Continuous: 1500VRMS max
Transient: ANSI/IEEE C37.90.1-1989

CMR (50 or 60Hz)
110dB

Accuracy
±0.05% Span (±0.08% max)

Nonlinearity
±0.02% Span (±0.035% max)

Stability
Zero: ±0.5μA/°C (±1μA/°C max)
Span: ±20ppm/°C (±40ppm/°C max)

Noise
Output ripple, 100Hz bandwidth: 10μAP-P
(20μAP-P max)

Bandwidth, -3dB
400Hz

Sample and Hold
Output droop rate: 40μA/S
Acquisition time: 50μS

Track-and-Hold Enable Control

Max Logic "0": +1V
Min Logic "1": +2.5V
Max Logic "1": +36V
Input Current, "0": 1.5mA

Power Supply Voltage
+5VDC ±5%

Power Supply Current
170mA max

Power Supply Sensitivity
±0.25μA/%

Environmental

Operating Temperature Range: -40 to 85°C
Storage Temperature Range: -40 to 85°C
Relative Humidity: 0 to 95% noncondensing
RFI Susceptibility: ±0.5% span error @ 400MHz, 5W, 3 ft.

Approvals (CSA, FM)
Class I; Division 2; Groups A, B, C, D.



Digital I/O Modules



Solid-State Plug-in Relays

Digital I/O modules (solid-state relays) monitor and control on/off levels on discrete devices. Up to 16 modules plug into an industry-standard termination panel (in any mix).

Input Modules

Input modules monitor and convert AC or DC voltage levels from field devices into a voltage that can be interfaced to a host computer. Typical applications include monitoring photo-electric switches, encoders, proximity switches, and TTL level devices. AC input modules sense the presence or absence of voltage or sensing contact closures.

Output Modules

Output modules convert host computer signals into voltages that can be used to activate various devices. Both AC and DC output modules can be used to control relays, solenoids, contactors, motor starters, heaters, AC lamps, and indicators.

Ordering Information

Model	Input	Output
IAC5 AC input	90 to 140V AC	none
IAC5-A AC input	180 to 280V AC	none
IDC5 DC input	4 to 32V DC	none
IDC5-F DC input	4 to 32V DC, fast acting	none
OAC5-A AC output	none	24 to 280V AC
ODC5 DC output	none	5 to 60V DC
ODC5-R DC output	none	Dry contact SPST relay, 0 to 100V DC

Accessories

- APB08H-SSR
Digital I/O termination panel, holds 8 modules
- APB16H-SSR
Digital I/O termination panel, holds 16 modules
- 4TPC-HH-2
Digital I/O cable, 2 feet long
- 4TPC-HH-6
Digital I/O cable, 6 feet long

Special Features

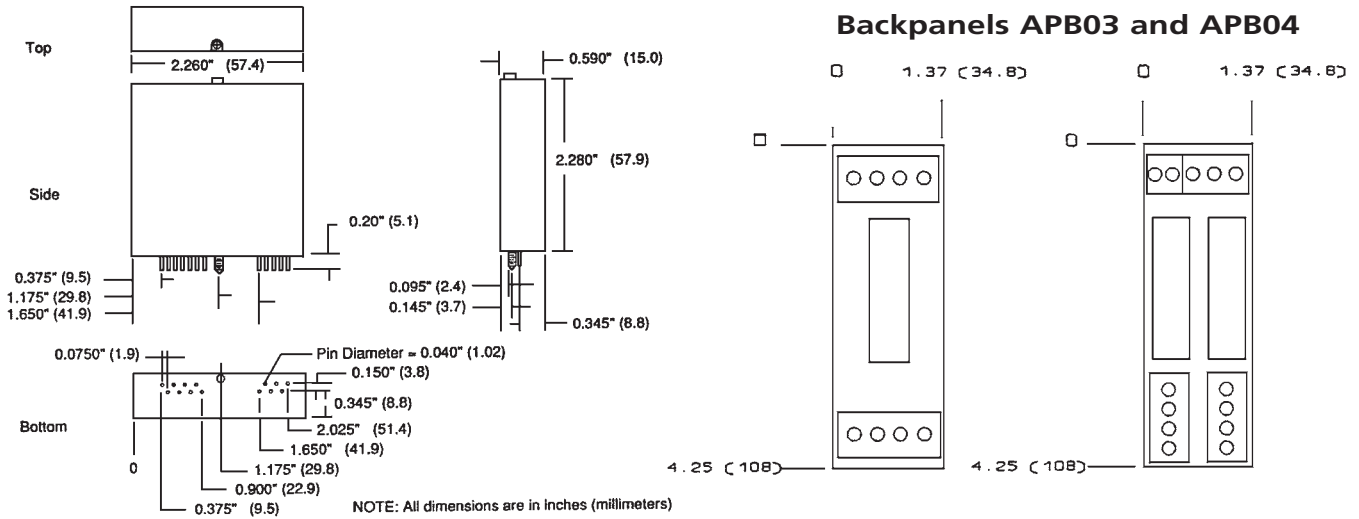
- Industry-standard format ensures compatibility with existing systems
- Isolation protects equipment from harmful transient signals
- RFI resistance minimizes the effects of noise
- Low cost helps meet tight budgets

Performance

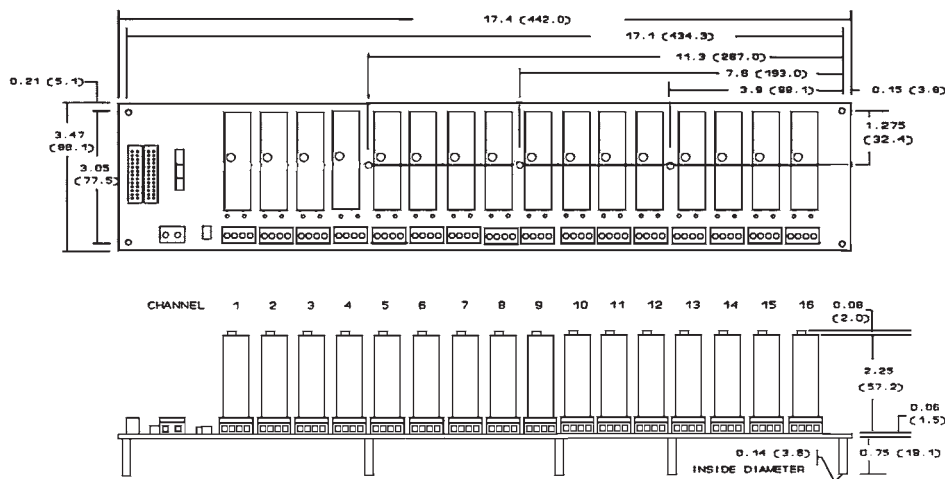
- Isolation**
250V AC (354V DC) continuous,
1500V AC breakdown.
- Surge withstand capability (SWC)**
Meets ANSI/IEEE C37.90-1978
- Ambient temperature range**
-13 to 158°F (-25 to 70°C)
- Cables**
50-wire ribbon cable with 50-pin/socket connectors
- Approvals (CSA, FM)**
Class I; Division 2; Groups A, B, C, D.
- Additional specifications**
For the complete specifications listing, call the factory.



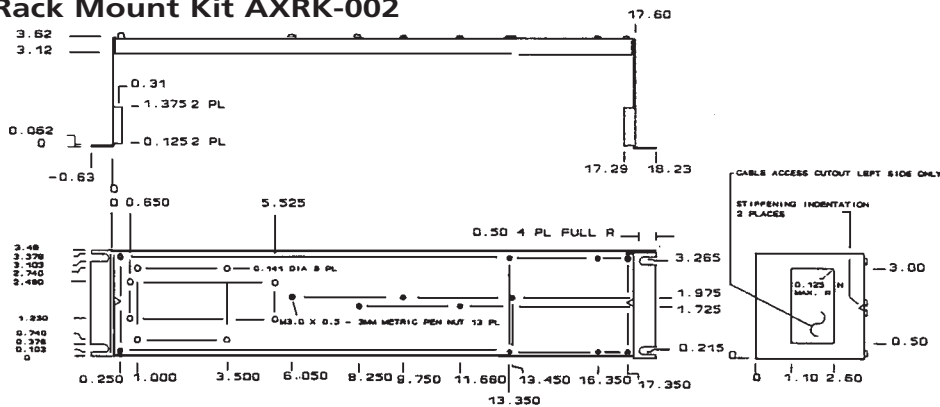
Dimensions



Backpanel APB01, APB02



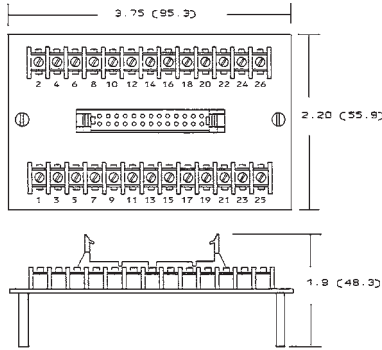
Rack Mount Kit AXRK-002



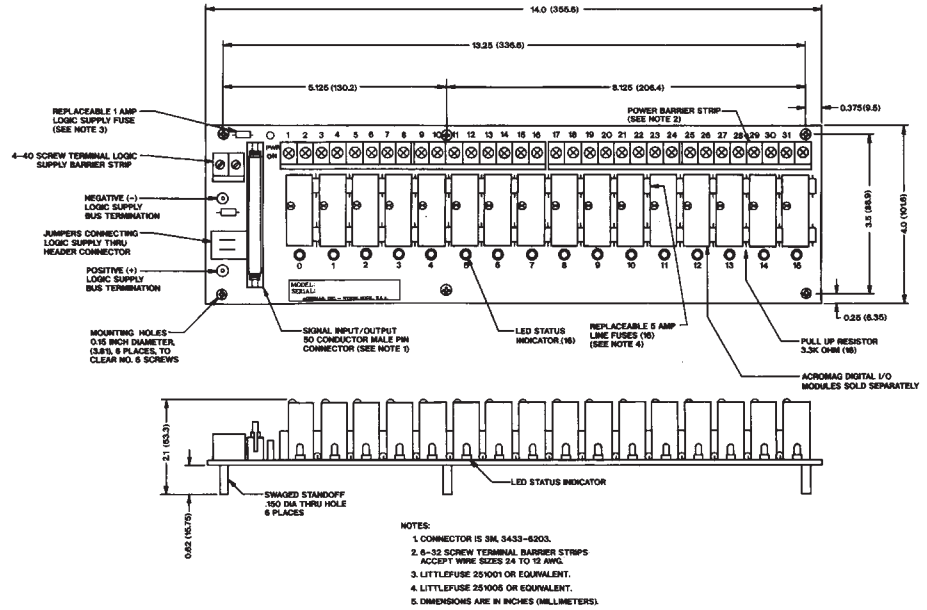


Dimensions

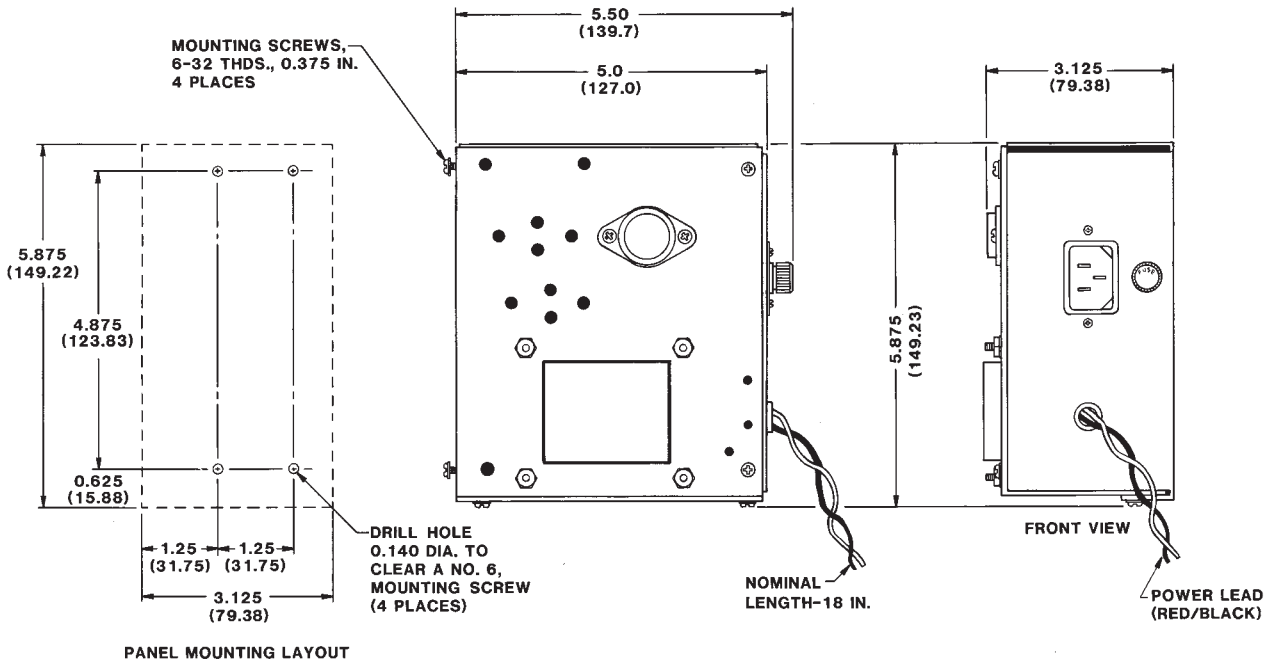
AXIF Outline Drawing



Digital I/O Panel APB16H-SSR



Power Supplies AXPRT-003 (115V) and AXPRES-003 (230V)



Dimensions are in inches (millimeters).