



AP4003-0001

Action PAK® AP4003

Potentiometer Input Signal Conditioner

Provides a DC Output in Proportion to a Potentiometer Position Input



- Constant Voltage Excitation
- 100 to 100k Ohm Potentiometers
- Tank Level and Position Applications
- Selectable Failsafe/Latching Operation

- Plug-in Installation
- Selectable Failsafe/Latching Operation
- AC Line Powered

Description

Model AP4003-0001 is the new version of the previous AP4003-xxxx series. Wide-ranging technology from the Ultra Slimpak II series has been utilized in this new version. This single model contains all of the input capability of previous dash numbers without the need for custom ranging from the factory. The resistance range is still 100 to 100k ohms. The default range is 0 to 100% but any portion of the span from 10% to 100% can be selected by pushbutton ranging. Four output ranges (0-5VDC, 0-10VDC, 0-20mA and 4-20mA) are available. A 15VDC output can also be used, but at a reduced drive level of 3mA. The default output is 4-20mA.

Applications

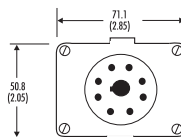
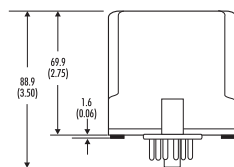
The AP4003-0001 is useful for converting potentiometer settings to voltage or current. It can be used anywhere a potentiometer or slidewire is used to determine position, displacement or rotation. The constant-voltage excitation allows use with potentiometers/slidewires with total resistances from 100 ohms to 100k ohms without affecting accuracy. For additional information on calibration, operation and installation, contact our Technical Support Group.

Mounting

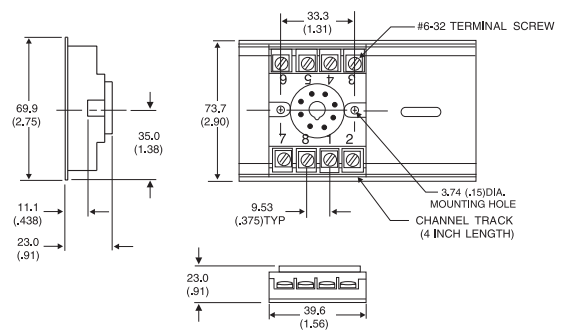
All Action Paks feature plug-in installation. Model AP4003 uses an 8-pin base, either molded socket (M008) or DIN rail socket (MD08).

Dimensions

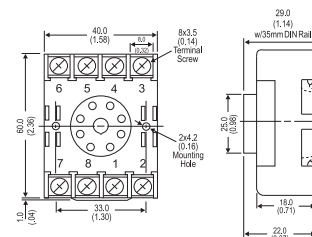
Dimensions are in millimeters (inches)



Mark III



M008 (Track/Surface)



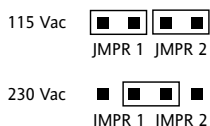
MD08 (DIN Rail)

Mounting

All Action Paks feature plug-in installation. The AP4003-0001 uses an 8-pin base, either the molded socket (M008) or the DIN rail socket (MD08). An optional retaining spring (M801) is available if required for the application.

Power Connections

See the pin connections at the back of this document. The unit supports either 115VAC input (the default) or 230VAC input. For 230VAC input, the jumpers next to the input transformer (on the base board) need to be changed according to the diagram below.



Diagnostic LEDs

Other than when executing the pushbutton calibration routine, the LEDs blink under the following conditions:

GREEN: 2Hz when the input is under range 8Hz when the input is over range

RED: 2Hz when the output is under range 8 Hz when the output is over range

An Under Range condition exists when the signal is lower than the operational low value minus 6.25% of the operational span. An Over Range condition exists when the signal is higher than the operational high value plus 6.25% of the operational span.

A voltage output short circuit may cause an under range condition (RED blinking at a 2Hz rate). A current output open circuit may cause an over range condition (RED blinking at an 8Hz rate). There could be two or more LEDs blinking at the same time. That means the module has more than one error condition present. Only when all error conditions have been cleared will the LEDs be back to their normal condition (Green ON, Red and Yellow OFF).

Calibration

For best results, calibration should be performed in the operating environment, allowing at least one hour warm-up for thermal stability of the system. If pre-calibration on a test bench is desired, then an output load equal to the input impedance of the devices connected to the AP4003-0001 output is recommended, along with the warm-up period.

Note: Many applications do not require calibrating the output levels and simply utilize the default operational ranges of the unit (0-5VDC, 0-10VDC, 0-20mA or 4-20mA). If the factory default calibration has been changed, the last saved operational output values are utilized. In those applications, the only calibration required is the operational input values. Once the maximum and minimum input values have been set, the Green and Red LEDs will be on. At this point, simply press the CAL button rapidly 3 times and you will exit the calibration routine without effecting the last saved calibration for the operational output values.

1. Connect a precision, multi-turn potentiometer of the required value to the input, with the CW lead connected to Pin 6, the Wiper lead to Pin 5 and the CCW lead to Pin 4. Connect the output to a voltage or current meter, depending on your application. Apply power and allow the system to reach thermal equilibrium.

2. Rotate the pot fully CW or to the desired maximum point and observe that the Green LED is on or flashing. Push the CAL button and hold for more than 4 seconds. The Yellow and Red LEDs should be on. Push the CAL button momentarily and the Yellow and Green LEDs will be on. (From this point on, you can exit the calibration procedure at any step without saving new data by holding the CAL button for at least 4 seconds.)

3. With the pot at the maximum input signal level desired, push the CAL button. The Yellow LED should now be on.

4. Rotate the pot to the full CCW position, or the exact minimum input signal level desired, then push the CAL button. The Green and Red LEDs should now be on. If you do not wish to change the output calibration, press the CAL button rapidly three times to exit the calibration routine.

5. If you do wish to do a custom operational range for the output, rotate the pot CW until the output is precisely at the desired maximum level (e.g. 20.00mA), then push the CAL button. The Red LED should be on.

6. Rotate the pot CCW until the output is precisely at the desired minimum level (e.g. 4.00mA), then push the CAL button. All three LEDs should now be on.

7. To finish calibration, push the button one final time. The calibration data is now saved. The Green LED should be on if the input is within the calibrated range.

Default Settings

Input Range: 0 to 100%

Output Range: 4 to 20mA

Table 1. Output Range

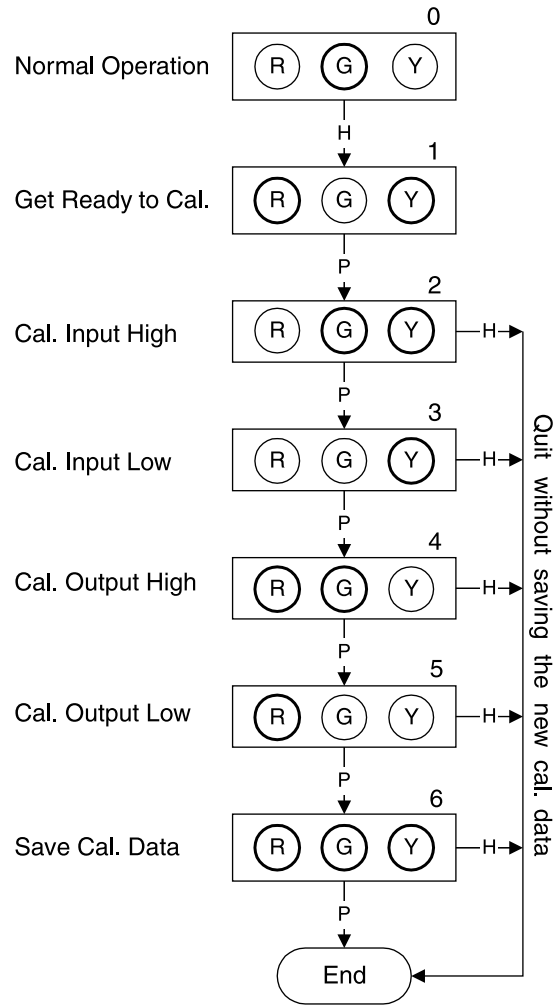
Function	S1		
	1	2	3
Output Range			
4 to 20 mA			
0 to 20 mA			■
0 to 5 Vdc		■	
0 to 10 Vdc		■	■






Key: ■ = 1 = ON or Closed

Table 2. Output Form

Function	S1
	4
Output Form	
Direct Out	
Reverse Out	■

Key: ■ = 1 = ON or Closed



-  Off
-  On
-  Flash 10 Hz
-  —H→ Hold button 4 sec.
-  —P→ Press button

NOTE: If there is no data change from step 4 to 6, the output calibration data will remain unchanged

Figure 1. Calibration Flow Chart

Specifications

Input:

Impedance: >100M ohms
Linearity: $\pm 0.1\%$ of span, typical
Excitation: 300mV, nominal
Potentiometer Resistance:
100 ohms (min) to 100k ohms (max)
(end to end)
Input Range:
Any portion of the potentiometer from
10% to 100% using pushbutton
calibration
Turn-Up/Turn-Down: 75%
(90% of span @ 0.5% linearity; 80% of
span @ 0.15% linearity)

Common Mode Rejection:

60Hz: >100dB
DC: >120dB

Output Ranges:

0-5VDC, 0-10VDC
(higher voltage to 15V @ 3mA drive)
0-20mA
4-20mA

Response Time:

100mSec, typical

Stability:

± 100 ppm ($\pm 0.01\%$) of span/ $^{\circ}$ C, typical

Output Ripple:

0.2% of span, or 5mVrms, whichever is greater

Output Impedance:

Voltage Output: <10 ohms
Current Output: >100k ohms

Output Drive:

Voltage Output: 10mA, max
Current Output: 20V compliance @20mA

LED Indication:

RUN (Green): On when unit is powered.
Flashes at 2Hz when input is below
operational low minus 6.25% of
operational span.

Flashes at 8Hz when input is above
operational span plus 6.25% of
operational span. INPUT (Yellow): On
while calibrating the input level.

OUTPUT (Red): On while calibrating the
output level. Flashes at 2Hz when output
is below operational low minus 6.25% of
operational span. Flashes at 8Hz when
output is above operational span plus
6.25% of operational span.

Temperature Range:

Operating: 0 to 60 $^{\circ}$ C (32 to 140 $^{\circ}$ F)
Storage: -20 to 85 $^{\circ}$ C (-4 to 185 $^{\circ}$ F)

Humidity:

Operating: 15 to 95% RH non-condensing
Non-operating: 90% RH @ 65 $^{\circ}$ C for 24 hrs

Power Consumption:

3W typical, 5W max
Standard: 115/230VAC $\pm 10\%$

Isolation:

Input to Output Power: 1500VDC

Agency Approvals:

CSA C22.2, No. 0-M91, 142-M1987
UL508

Ordering Information

Specify:

1. Model: **AP4003-0001**

Accessories:

M801-0000 Retaining Spring
M008-A 8 pin Track Mount Socket
M004-0000 4 ft Long Channel Track
MD08-0000 8 pin DIN Mount Socket

Pin Connections

- 1 AC Power (Hot)
- 2 Shield (GND)
- 3 AC Power (Neu)
- 4 Pot CCW/Shield
- 5 Pot W
- 6 Pot CW
- 7 Output (+)
- 8 Output (-)

Eurotherm[®]

by **Schneider Electric**

Schneider Electric Systems USA, Inc.

44621 Guilford Drive, Suite 100

Ashburn, VA 20147

703-724-7300

info.eurotherm.us@schneider-electric.com



Printed on recycled paper

Factory Assistance

For additional information on calibration, operation and installation
contact our Technical Services Group:

703-724-7314

US.Support@schneider-electric.com

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