

Figure 1: Limit alarm operation and effect of deadband(s).

### DYNAMIC DEADBAND

The input must remain beyond the setpoint for 100 milliseconds, uninterrupted, to qualify as a valid trip condition. Likewise, the input must fall outside the deadband and remain there for 100 milliseconds to return the alarm to an untripped condition. This effectively results in a “dynamic deadband” — based on time — in addition to the normal deadband.

### OPTIONS

- U** Urethane coating of internal circuitry for protection from corrosive atmospheres.
- P** Top Mounted, Ten-Turn Clockface Dial(s) for setpoint adjustment.
- C620** Factory calibration of input range, set points and output relays. Not available with option P.

### CONFIGURATION

The factory presets are as follows:

Input 0-500mV  
 Output Dual, SPDT  
 Trip A: HI, B: LO  
 Latching No  
 Failsafe No  
 Deadband A/B: 0.25%  
 Power 120VAC

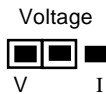
For other input ranges, remove the four base screws and case to access the configuration switches.

Replace the cover before applying power.

Refer to Figure 4 for switch locations.

#### INPUT

1. Position input jumper “W1” for voltage or current inputs.



2. Using Table 1, position “W2” and set DIP switches “S1-S6” for the desired maximum setpoint input. Round desired maximum input values to the next highest range (e.g., 0-120V = 200V range).

#### OUTPUT

1. Configure the Mode Selector for the required function. See Figure 5.

### POWER

1. Configure the AC jumpers for either 120 or 240VAC operation. See Figure 6.

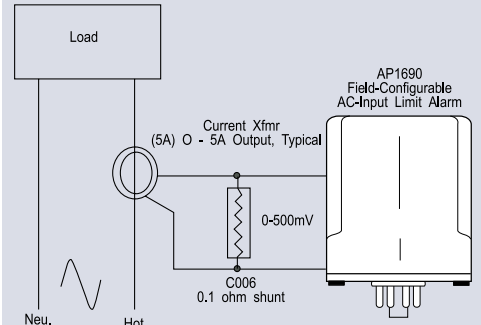
### CALIBRATION

*Note: To maximize thermal stability, final calibration should be performed in the operating installation, allowing approximately 1-2 hours for warmup and thermal equilibrium of the system.*

**Setpoint:** Set deadband at its minimum (factory default - fully CCW) before adjusting the setpoint. With the specified trip voltage or current input applied, adjust setpoint until the relay trips. For HI trip calibration, start below the desired trip.

**Deadband:** Set deadband to its minimum (factory default - fully CCW). Set setpoint to desired trip. Adjust voltage or current input until relay trips. Readjust deadband to 50% (fully CW). Set voltage or current input to desired deadband position. Slowly adjust deadband until relay untrips.

### TYPICAL APPLICATION



Load monitoring using a current transformer and the AP1690

### FACTORY ASSISTANCE:

For additional information on calibration, operation and installation please contact Action’s Technical Services Group. Call toll-free:

**800-767-5726**

Table 1: AP1690 Input Range Selector-Switch Settings

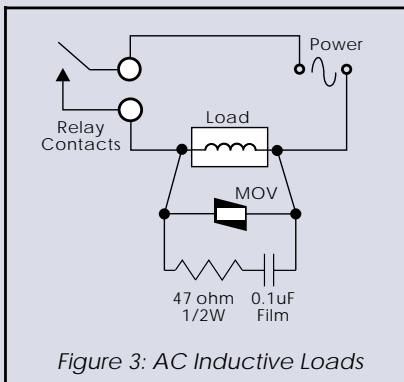
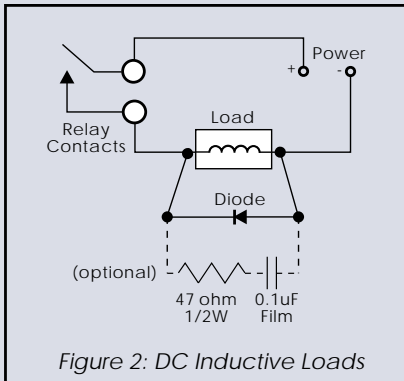
Voltage	Current	Input Range Selector
100mV	10mA	SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
200mV	20mA	SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
500mV	50mA	SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
1V	100mA	SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
2V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
5V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
10V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
20V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
50V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
100V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H
200V		SW1: ON, 1, 2, 3, 4, 5, 6; W2: L, H

Table 3: AP1690 Input Jumper Settings

Input	Input Jumper Selector (W1)
Voltage	V, I
Current	V, I

## SPECIFICATIONS

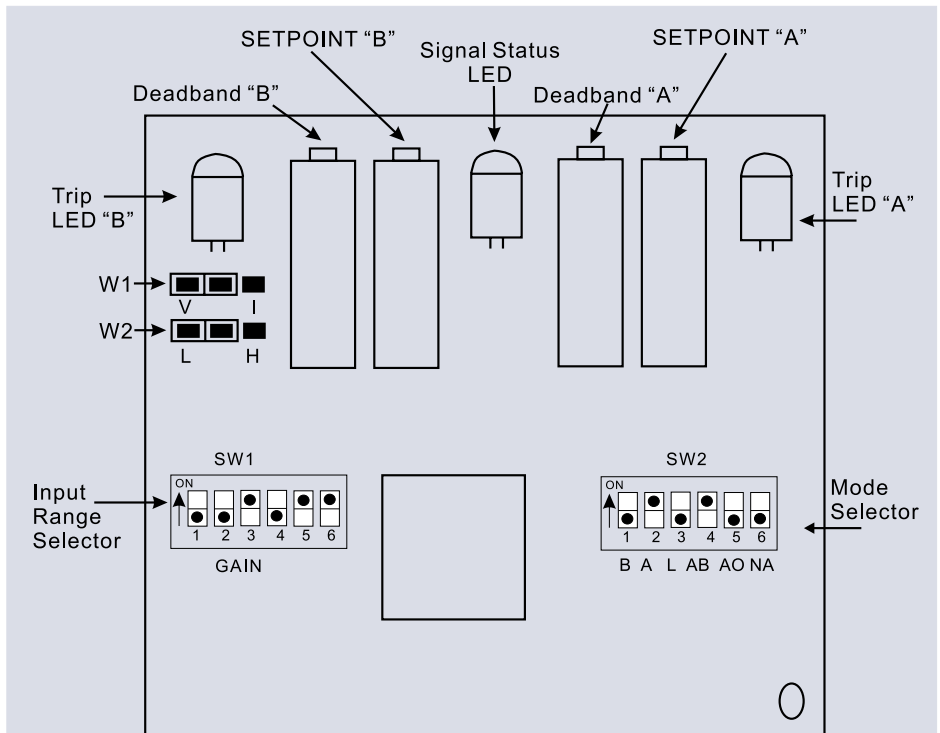
<b>Inputs</b>	Voltage Input Range: 100mV to 200VAC Impedance: >100K $\Omega$ Overvoltage: 300VAC, max. Current Input Range: 10mA to 100mAAC Impedance: 20 $\Omega$ , typical Overcurrent: 200mAAC, 60V peak, max Frequency Range: DC to 400Hz, factory calibrated at 60Hz Common Mode (Input to Ground): 1000V, max	<b>Stability</b>	Line Voltage: $\pm 0.01\%$ %, max. Temperature: $\pm 0.025\%$ of full scale/ $^{\circ}\text{C}$ , max.
<b>LED Indications</b>	Input Range (Green) >100% input: 8Hz flash (approx) Setpoint (Red): Tripped: Solid red Safe: Off	<b>Common Mode Rejection</b>	DC to 60Hz: 120dB
<b>Limit Differentials (Deadbands)</b>	0.25% to 50% of selected span	<b>Isolation</b>	1000VDC between contacts, input and power
<b>Response Time</b>	Dynamic Deadband: Relay status will change when proper setpoint/process condition exists uninterrupted for 100msec Normal Mode (analog filtering): <250msec, (10-90%)	<b>ESD Susceptibility</b>	Meets IEC 801-2, Level 2 (4KV)
<b>Setpoint</b>	Effectivity: Setpoint(s) are adjustable over 100% of the selected input span. Repeatability (constant temp): 0.1% of selected input span	<b>Humidity</b>	Operating: 15 to 95% (@45 $^{\circ}\text{C}$ ) Soak: 90% for 24 hours (@65 $^{\circ}\text{C}$ )
		<b>Temperature Range</b>	Operating: 0 to 60 $^{\circ}\text{C}$ (32 to 140 $^{\circ}\text{F}$ ) Storage: -15 to 70 $^{\circ}\text{C}$ (5 to 158 $^{\circ}\text{F}$ )
		<b>Power</b>	Consumption: 2W typical, 5W max Standard: Selectable 120/240VAC ( $\pm 10\%$ , 50-60Hz)
		<b>Relay Contacts</b>	1 SPDT (1 Form C) per setpoint Current Rating (resistive) 120VAC: 5A 240VAC: 2A 28VDC: 5A Material: Gold flash over silver alloy Electrical Life: 10 <sup>6</sup> operations at rated load <i>Note: External relay contact protection is required for use with inductive loads. See Relay Protection section.</i> Mechanical Life: 10 <sup>7</sup> operations
		<b>Latch Reset Time</b>	5 seconds
		<b>Weight</b>	0.64bs
		<b>Agency Approvals</b>	CSA certified per standard C22.2 (File No.LR42272-54). UL recog nized per standard UL 805 (File No. E99775)



## RELAY PROTECTION AND EMI SUPPRESSION

When switching inductive loads, maximum relay life and transient EMI suppression is achieved using external protection (see Figure 2 & 3). Place all protection devices directly across the load and minimize all lead lengths. For AC inductive loads, place a properly-rated MOV

across the load in parallel with a series RC snubber. Use a 0.01 to 0.1 $\mu\text{F}$  pulse film capacitor (foil polypropylene recommended) of sufficient voltage, and a 47 $\Omega$ , 1/2W carbon resistor. For DC inductive loads, place a diode across the load (PRV > DC supply, 1N4006 recommended) with (+) to cathode and (-) to anode (the RC snubber is an optional enhancement).



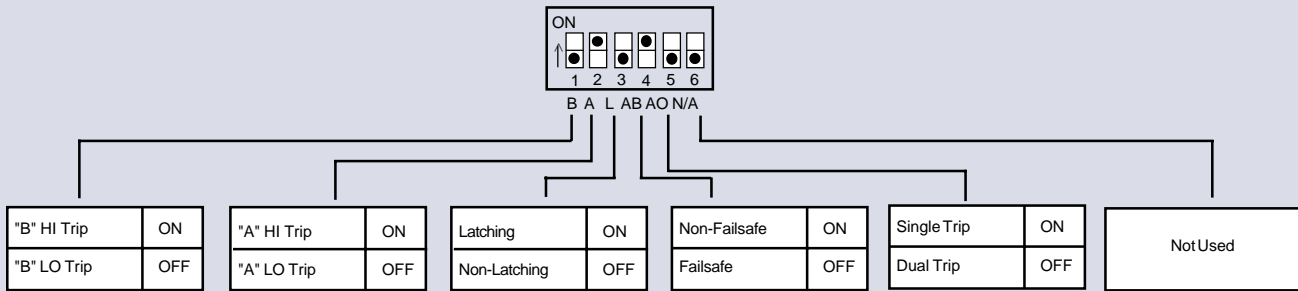
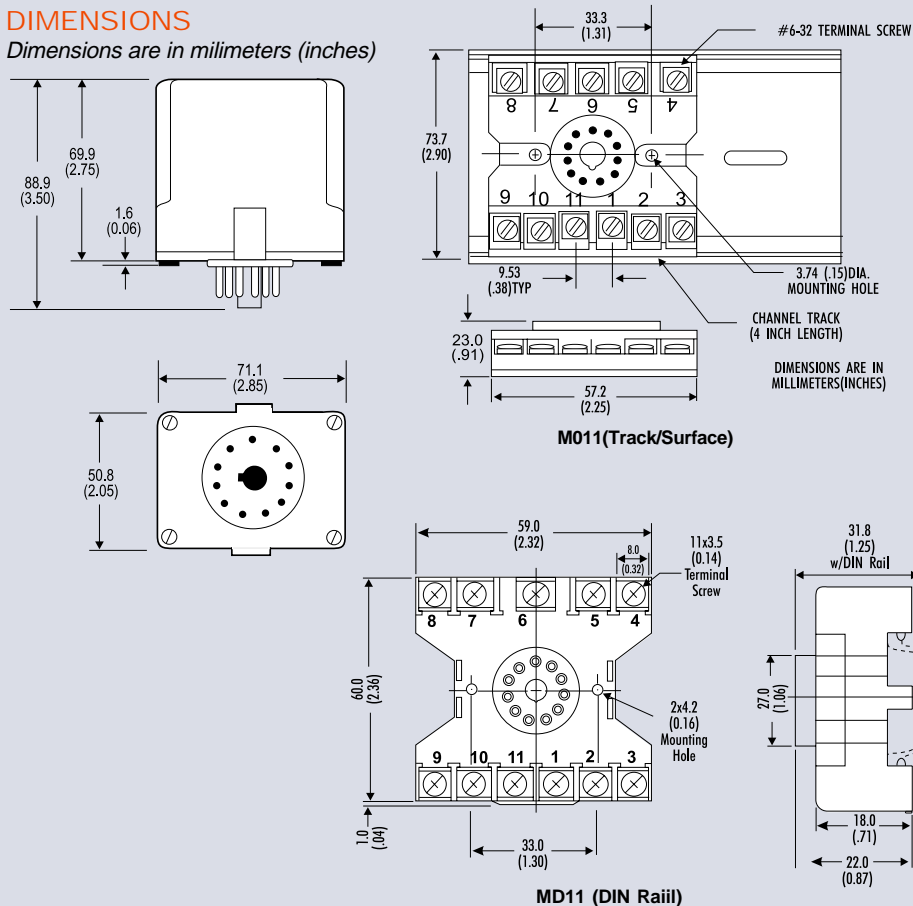


Figure 5: Mode Selection Dual Trip/A: HI, B: LO, Non-Latching, Non-Failsafe

## DIMENSIONS

Dimensions are in millimeters (inches)



120 VAC Operation

240 VAC Operation

Figure 6: 120/240 VAC Selection

## MODELS & ACCESSORIES

### Mounting

All Action Paks feature plug-in installation. Model AP1690 use an 11-pin base and either molded socket M011 or DIN rail socket MD11.

### ORDERING INFORMATION

#### Specify:

- Model: **AP1690-2000**
- Options: U, P (see text)
- Line Power (see specs.)  
(All power supplies are transformer isolated from the internal circuitry)
- C006** (0.1Ω shunt for 1 to 5Amp current inputs).

### Pin Connections

- AC Power (Hot)
- No Connection
- AC Power (Neu)
- Input
- Input
- N.O.
- C
- N.C.
- N.O.
- C
- N.C.

#### Key:

N.O. = Normally Open  
C = Common  
N.C. = Normally Closed

\*Contacts are in the "normal" state when the relay is de-energized.