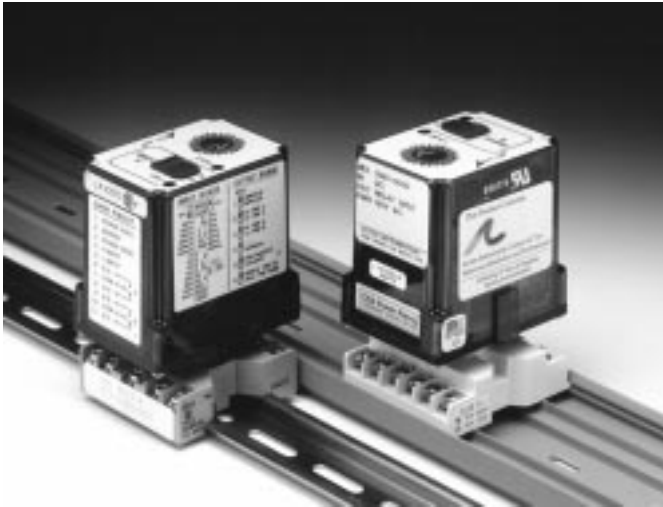


Action Pak®

AC Input, Field Configurable Limit Alarms

Models AP1680, AP1690



Provides Relay Contact Closure(s) at a Preset AC-Input Level

- Field Configurable Input Ranges for AC Voltage for Current
- Setpoint(s) Programmable HI or LO
- Exclusive “Dynamic Deadband” Prevents False Trips
- Selectable Failsafe/Latching Operation
- LED Trip Indicators
- Selectable 120/240VAC Operation
- Lifetime Warranty

DESCRIPTION

Action Pak models AP1680 single setpoint and AP1690 dual setpoint limit alarms offer flexible, wide ranging AC input and relay output capability. Voltage spans from 100mV to 200VAC and current spans from 10mA to 100mAAC can be field configured. For current input spans of 1 to 5 Amps a 0.1 Ω (0.1%) shunt resistor (Model #C006) is available. Both models offer configurable latching, failsafe, and HI/LO operation. The AP1680 and AP1690 also include 0.25% to 50% adjustable deadbands and selectable 120/240VAC operation.

DIAGNOSTIC LED

Models AP1680 and AP1690 are equipped with a dual function diagnostic LED. The green center LED indicates line power and input signal status. Active line power is indicated by an illuminated LED. If the center LED is off, check line power and the wiring connection. If the input signal is above 100% full scale, the LED will flash at approximately 8Hz.

OUTPUT SELECTION

The single setpoint AP1680 and the dual setpoint AP1690 provide the following relay outputs:

AP1680 Single Trip (DPDT, 5A)
AP1690 Single/Dual Trip (2 SPDT, 5A)

Setpoint(s) are top accessed 15-turn potentiometer(s) or option "P" provides ten-turn clock face dial(s).

OPERATION

The field configurable AP1680 and AP1690 limit alarm setpoint(s) can be configured for HI, LO, latching and/or failsafe trip operation. Non-latching HI and LO setpoints have respective HI and LO deadbands. In a tripped condition, the setpoint is exceeded and the appropriate red LED will illuminate. The non-latching trip will reset only when the process falls below the HI deadband or rises above the low deadband (see figure 1). To reset a latched setpoint the signal must be in the safe region and the line power turned off for at least 5 seconds. For proper deadband operation, the HI setpoint must always be set above the LO setpoint.

In failsafe operation, the relay is energized when the process is below the HI setpoint or above the LO setpoint (opposite for non-failsafe). In the failsafe mode, the relays go to the trip condition when power fails.

DYNAMIC DEADBAND

LSI circuitry prevents false trips by repeatedly sampling the input. 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.

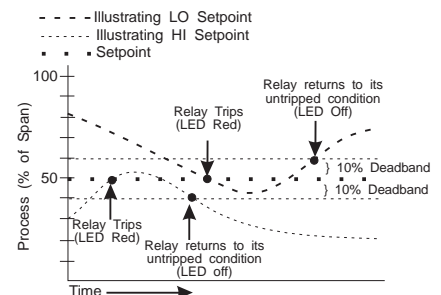


Figure 1: Limit alarm operation and effect of deadband(s).

OPTIONS

- U** Urethane coating of internal circuitry for protection from corrosive atmospheres.
- P** Top Mounted, Ten-Turn Clockface Dial(s) for setpoint adjustment.

CONFIGURATION

The factory presets models AP1680 and AP1690 as follows:

	AP1680	AP1690
Input	0-500mV	0-500mV
Output	Single, DPDT	Dual, SPDT
Trip	HI	A: HI, B: LO
Latching	No	No
Failsafe	Yes	No
Deadband	0.25%	A/B: 0.25%
Power	120VAC	120VAC

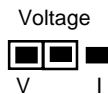
For other input ranges, remove the four base screws and case to access the configuration switches.

Replace the cover before applying power.

Refer to Figure 4 for configuration.

Input

- Position input jumper "W1" for voltage or current inputs.



- 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

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

Power

- 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 (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 (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.

FACTORY ASSISTANCE:

For additional information on calibration, operation and installation please contact Action's Technical Services Group. Call toll-free: 800-767-5726

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 0.1µF pulse film capacitor (foil polypropylene recommended) of sufficient voltage, and a 47Ω, 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).

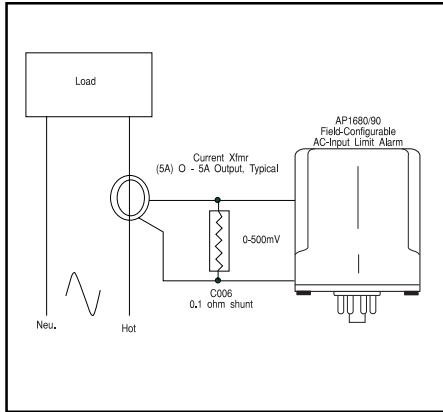
Table 1: AP1680/AP1690 Input Range Selector-Switch Settings

Voltage	Current	Input Range Selector (SW1 & W2)	
100mV	10mA	SW1	W2
200mV	20mA		
500mV	50mA		
1V	100mA		
2V			
5V			
10V			
20V			
50V			
100V			
200V			

Table 3: AP1680/AP1690 Input Jumper Settings

Input	Input Jumper Selector (W1)
Voltage	
Current	

TYPICAL APPLICATION



Load monitoring using a current transformer and the AP1680/90

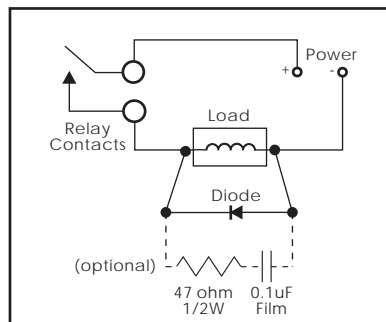


Figure 2: DC Inductive Loads

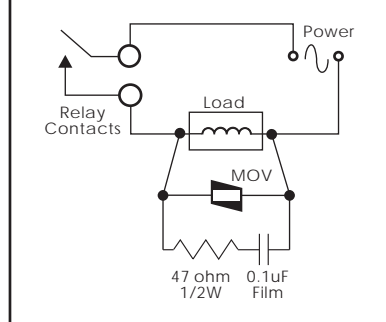


Figure 3: AC Inductive Loads

PIN CONNECTIONS*

AP1680, AP1690

1 AC Power (Hot)

2 Shield (Gnd)

3 AC Power (Neu)

4 Input

5 Input

6 N.O.

7 C

8 N.C.

9 N.O.

10 C

11 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.

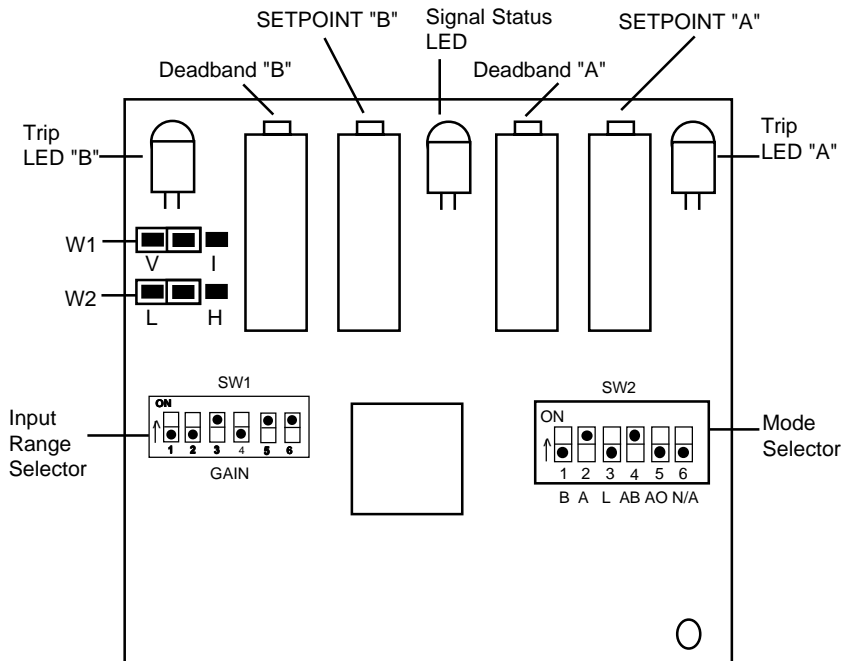


Figure 4: AP1690-2000 (Factory Calibration 0-500mV, Dual HI/LO, Non-Latching, Non-Failsafe)

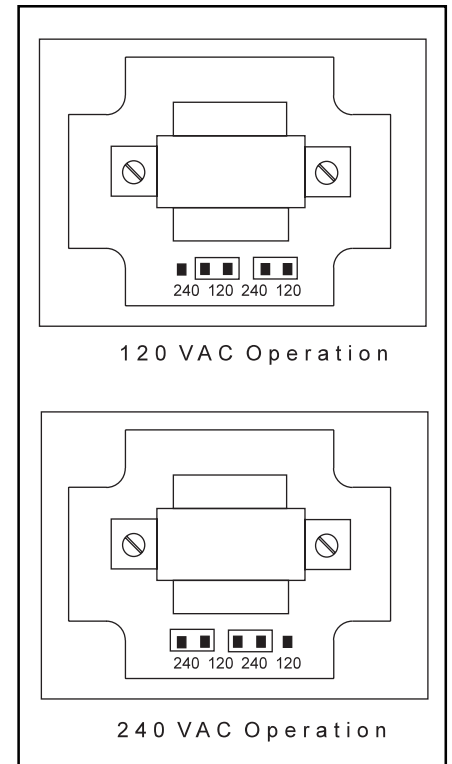


Figure 6: 120/240 VAC Selection

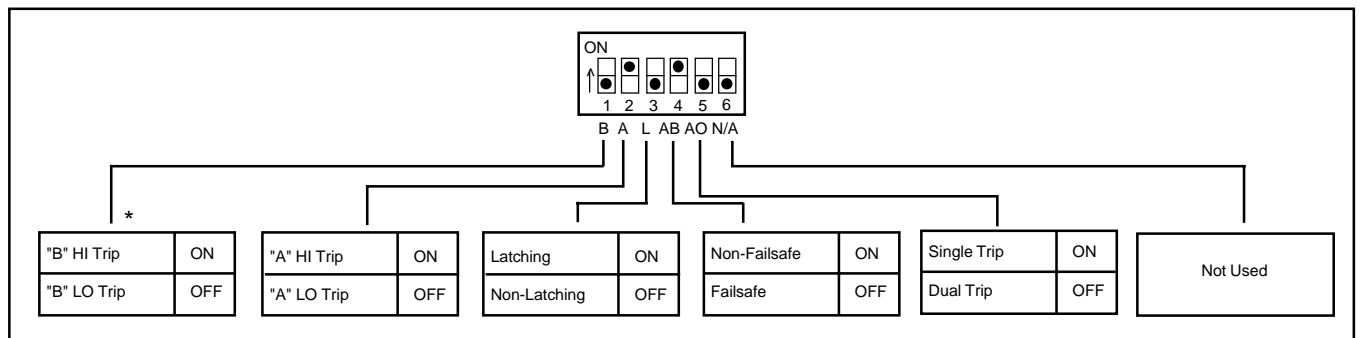


Figure 5: Mode Selection
Dual Trip/A: HI, B: LO, Non-Latching, Non-Failsafe
*Applicable for AP1690-2000, only

SPECIFICATIONS

Inputs

Voltage Input

Range: 100mV to 200VAC
Impedance: >100K ohm
Overvoltage: 300VAC, max.

Current Input

Range: 10mA to 100mAAC
Impedance: 20 ohms, typical
Overcurrent: 200mAAC
60V peak, max.

Frequency Range: 40 to 400Hz,
factory calibrated at 60Hz

Common Mode (Input to
Ground): 1000V, max.

LED Indications

Input Range (Green)

>100% input: 8Hz flash (approx)

Setpoint (Red):

Tripped: Solid red

Safe: Off

Limit Differentials (Deadbands)

0.25% to 50% of selected span

Response Time

Dynamic Deadband: Relay status will
change when proper setpoint/process
condition exists uninterrupted for
100msec

Normal Mode (analog filtering):
<250msec, (10-90%)

Setpoint

Effectivity: Setpoint(s) are adjustable
over 100% of the selected input span.

Repeatability (constant temp):
0.1% of selected input span

Stability

Line Voltage: $\pm 0.01\%$ /%, max.

Temperature: $\pm 0.025\%$ of full
scale/ $^{\circ}\text{C}$, max.

Common Mode Rejection

DC to 60Hz: 120dB

Isolation

1000VDC between contacts,
input and power

ESD Susceptibility

Meets IEC 801-2, Level 2 (4KV)

Humidity

Operating: 15 to 95% (@45 $^{\circ}\text{C}$)

Soak: 90% for 24 hours (@65 $^{\circ}\text{C}$)

Temperature Range

Operating: 0 to 60 $^{\circ}\text{C}$ (32 to 140 $^{\circ}\text{F}$)

Storage: -15 to 70 $^{\circ}\text{C}$ (5 to 158 $^{\circ}\text{F}$)

Power

Consumption: 2W typical, 5W
max.

Standard: Selectable 120/240VAC
($\pm 10\%$, 50-60Hz)

Relay Contacts

AP1680: DPDT (2 Form C)

AP1690: 1 SPDT (1 Form C)
per setpoint

Current Rating (resistive)

120VAC: 5A

240VAC: 2A

28VDC: 5A

Material: Gold flash over silver alloy

Electrical Life: 10^5 operations at
rated load

Note: External relay contact protection
is required for use with inductive
loads. See Relay Protection section.

Mechanical Life: 10^7 operations

Latch Reset Time

5 seconds

Weight

AP1680 0.62lbs

AP1690 0.64bs

Agency Approvals

CSA certified per standard C22.2
(File No. LR42272-54). UL recog-
nized per standard UL 805
(File No. E99775)

MOUNTING

All Action Paks feature plug-in
installation. Models AP1680 and
AP1690 use an 11-pin base and
either molded socket M011 or DIN
rail socket MD11.

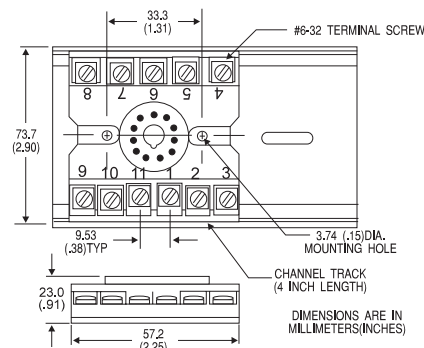
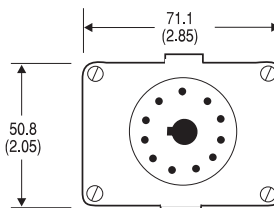
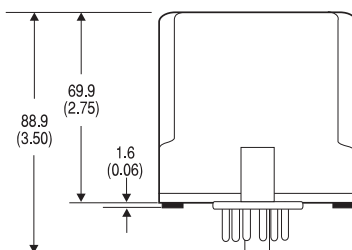
ORDERING INFORMATION

Specify:

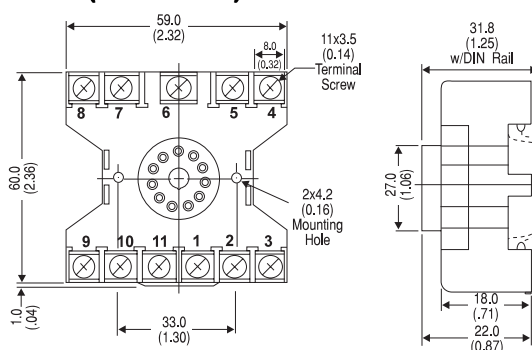
1. Model: AP1680-2000 or AP1690-2000
2. Options: U, P (see text)
3. Line Power (see specs.)
(All power supplies are transformer
isolated from the internal circuitry)
4. C006 (0.1 Ω shunt for 1 to 5Amp
current inputs).

DIMENSIONS

Dimensions are in millimeters (inches)



M011(Track/Surface)



MD11 (DIN Rail)

All Prices and Specifications subject to change without notice



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