

# ACTION PAK® AP1280 & AP1290

MODEL



## Benefits

- Easily Field Configurable Input Ranges for E, J, K, R, S and T Type Thermocouples
- Setpoint(s) Programmable HI or LO
- Exclusive "Dynamic Deadband" Prevents False Trips
- Selectable Failsafe/Latching Operation
- LED Trip Indicators
- Selectable 120/240VAC Power (9 to 30VDC Available)
- Lifetime Warranty



## Thermocouple Input, Field Configurable Limit Alarms

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

### DESCRIPTION

Action Pak models AP1280 and AP1290 limit alarms offer wide ranging input and flexible setpoint capability. They accept six popular thermocouple types with inputs ranging from  $-270^{\circ}\text{C}$  ( $-454^{\circ}\text{F}$ ) to  $1760^{\circ}\text{C}$  ( $3200^{\circ}\text{F}$ ). The AP1280 provides a single-setpoint alarm while the AP1290 provides two independent setpoint alarms. The AP1280 and AP1290 also include 0.25% -50% adjustable deadbands and selectable 120/240VAC power.

### DIAGNOSTIC LED

Models AP1280 and AP1290 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. Below 0%, the flash rate is approximately 4Hz.

### OUTPUT SELECTION

The two models of thermocouple limit alarms reflect two styles of output and setpoint selection:

<b>AP1280</b>	Single Trip (DPDT, 5A)
<b>AP1290</b>	Single/Dual Trip (2 SPDT, 5A)

Setpoint(s) are top accessed multi-turn potentiometers(s) or option "P" provides top mounted ten-turn dial(s).

### OPERATION

The field configurable AP1280 and AP1290 limit alarm setpoint(s) can be configured for HI, LO, latching and/or fail-safe 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 trip will reset only when the process falls below the HI deadband or rises above the LO deadband (see figure 1). To reset a latched setpoint the signal must be in the safe region and the line power must be 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 a HI setpoint or above a LO setpoint (opposite for non-failsafe). In the failsafe mode, a power failure results in an alarm condition.



*Protecting the  
Integrity of  
Industrial Process  
Signals*



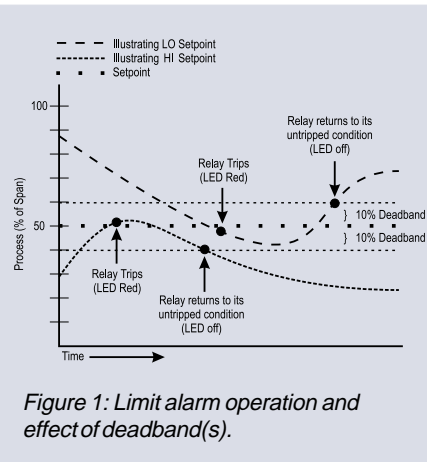


Figure 1: Limit alarm operation and effect of deadband(s).

### 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 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 for AP1280 and AP1290 are as follows:

	AP1280	AP1290
Input	J-type 0-360°C	J-type 0-360°C
Burn Out	Positive	Positive
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

Refer to Figure 4 for switch locations.

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

Replace the cover before applying power.

### INPUT

1. Using Table 1, configure positions 1 through 3 of SW1 and 1 through 5 of SW2 for the desired input range. Round desired maximum/minimum input values to the next highest range (e.g., 0-300°C = 0-350°C).

2. Choose the desired upscale/downscale thermocouple burnout detection by setting position 6 of SW2. See Figure 4.

Table 1: AP1280-1290 Input Ranges

TC Type	Temperature Range	SW1	SW2
E	0 to 150°C (32 to 302°F)		
E	0 to 290°C (32 to 554°F)		
E	0 to 660°C (32 to 1220°F)		
E	0 to 1000°C (32 to 1832°F)		
E	-270 to 150°C (-454 to 302°F)		
E	-270 to 290°C (-454 to 554°F)		
J	0 to 190°C (32 to 374°F)		
J	0 to 360°C (32 to 680°F)		
J	0 to 760°C (32 to 1400°F)		
J	-210 to 190°C (-346 to 374°F)		
J	-210 to 360°C (-346 to 680°F)		
K	0 to 250°C (32 to 482°F)		
K	0 to 480°C (32 to 896°F)		
K	0 to 1230°C (32 to 2246°F)		
K	0 to 1372°C (32 to 2501°F)		
K	-270 to 250°C (-454 to 482°F)		
K	-270 to 480°C (-454 to 896°F)		
R	0 to 970°C (32 to 1778°F)		
R	0 to 1690°C (32 to 3074°F)		
R	0 to 1760°C (32 to 3200°F)		
S	0 to 1050°C (32 to 1922°F)		
S	0 to 1760°C (32 to 3200°F)		
T	0 to 210°C (32 to 410°F)		
T	0 to 390°C (32 to 734°F)		
T	-270 to 210°C (-454 to 410°F)		
T	-270 to 390°C (-454 to 734°F)		

### OUTPUT

1. Configure positions 4 through 8 of SW1 for the desired alarm functions. See Figure 5.

### POWER

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

## SPECIFICATIONS

<b>Inputs</b>	Range: See Table 1 Impedance: >1 MΩ Input Bias Current (burnout detection): <1.5 microamp Overvoltage: ±10V differential Common Mode (Input to Ground): 600 VAC or 1000VDC, max	<b>Isolation</b>	1000V DC between contacts, input and power
<b>LED Indications</b>	Input Range (Green) >100% input: 8Hz flash <0% input: 4Hz flash Setpoint (Red): Tripped: Solid red One LED for each setpoint	<b>ESD Susceptibility</b>	Meets IEC 801-2, Level 2 (4kV)
<b>Limit Differentials</b>	(Deadbands) 0.25% to 50% of span	<b>Humidity</b>	Operating: 15 to 95% (@45°C) Soak: 90% for 24 hours (@65°C)
<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>Temperature Range</b>	Operating: 0 to 60°C (32 to 140°F) Storage: -15 to 70°C (5 to 158°F)
<b>Setpoint</b>	Effectivity: Setpoint(s) are adjustable over 100% of input span Repeatability (Constant Temp): ±0.2% for inputs > 0°C ±0.3% for inputs < 0°C	<b>Power</b>	Consumption: 2W typical, 5W max Standard: Selectable 120/240VAC (±10%, 50-60Hz) Optional: 9 to 30VDC Inverter-Isolated
<b>Stability</b>	Line Voltage: ±0.01%/%, max Temperature: ±0.05% of full scale/°C, max.	<b>Relay Contacts</b>	AP1280: DPDT (2 Form C) AP1290: 1 SPDT (1 Form C) per setpoint Current Rating (resistive) 120VAC: 5A 240VAC: 2A 28VDC: 5A Material: Silver-Cadmium Oxide Electrical Life: 10 <sup>9</sup> operations at rated load <i>Note: External relay contact protection is required for use with inductive loads. See relay protection.</i> Mechanical Life: 10 <sup>7</sup> operations
<b>Common Mode Rejection</b>	DC to 60Hz: 120dB	<b>Latch Reset Time</b>	5 seconds (with power removed)
		<b>Weight</b>	AP1280 0.72lbs AP1290 0.64lbs
		<b>Agency Approvals</b>	CSA certified per standard C22.2, No. 0-M1982 (File No. LR42272-8,9) UL recognized per standard UL 508, (File No. E99775)

## 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 appropriate input applied, adjust setpoint until the relay trips. For HI trip calibration, start with the setpoint above the desired trip. For LO trip calibration, start below the desired trip.

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

## RELAY PROTECTION AND EMI SUPPRESSION

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

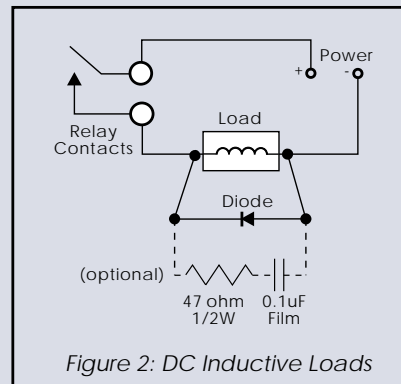


Figure 2: DC Inductive Loads

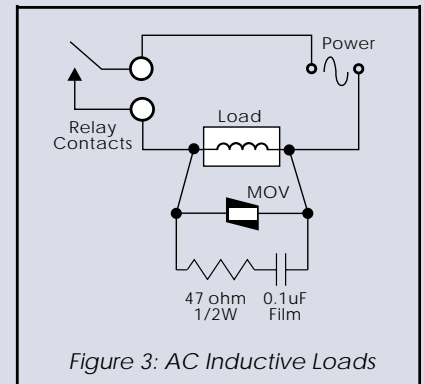


Figure 3: AC Inductive Loads

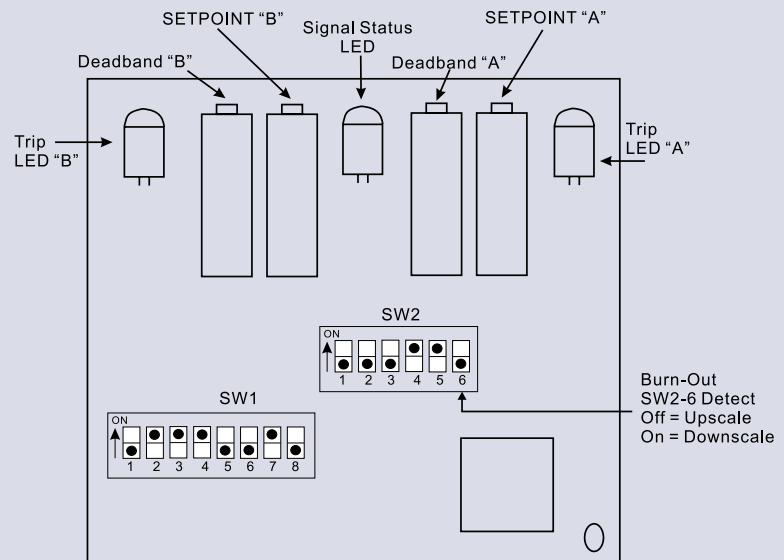


Figure 4: AP1290 Factory Calibration Type "J" 0-360°C Dual HI/LO, Non-Latching, Non-Failsafe

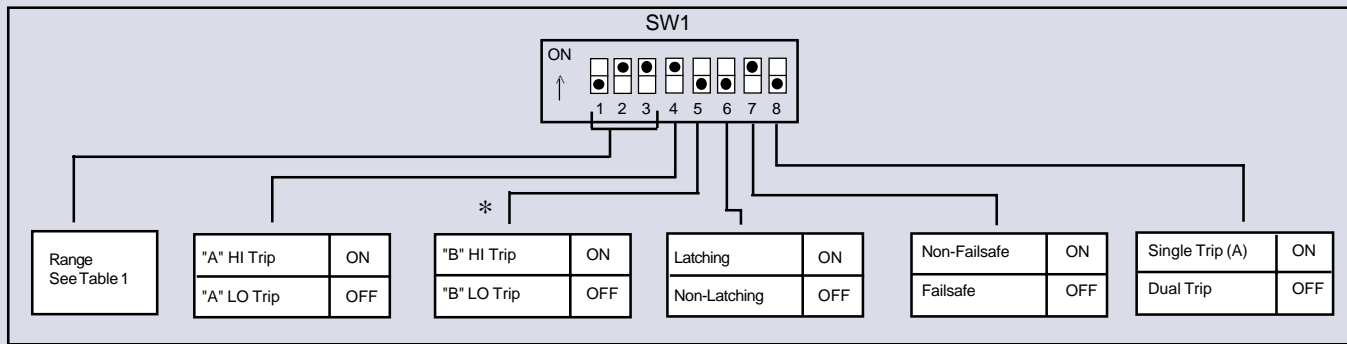
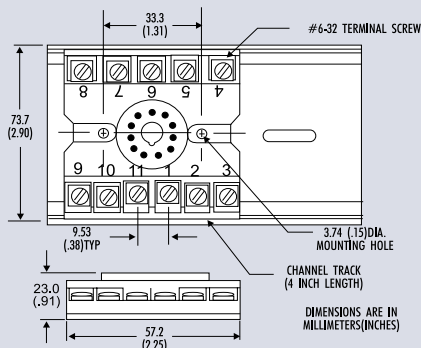
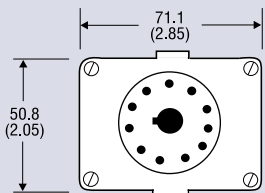
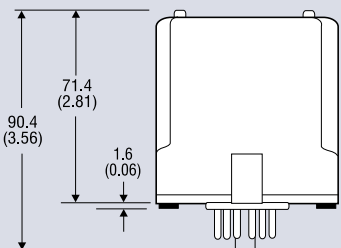


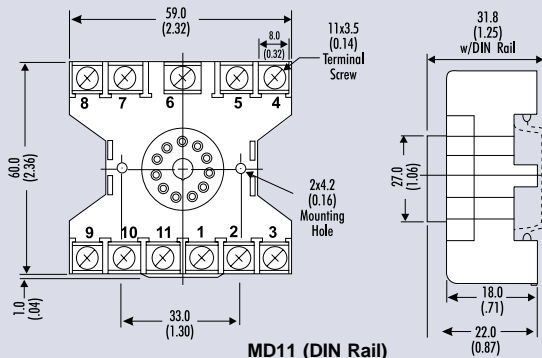
Figure 5: Mode Selection; Dual Trip/A: HI, B: LO, Non-Latching, Non-Failsafe  
\*Applicable for AP1290-2000 only

## DIMENSIONS

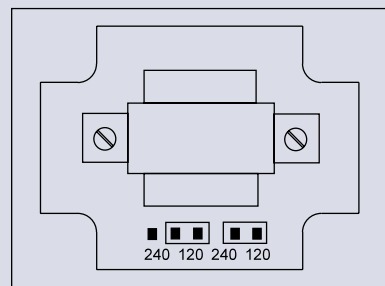
Dimensions are in millimeters (inches)



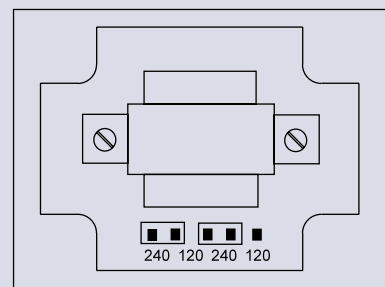
M011 (Track/Surface)



MD11 (DIN Rail)



120 VAC Operation



240 VAC Operation

Figure 6: 120/240 VAC Selection

## MODELS & ACCESSORIES

### Mounting

All Action Paks feature plug-in installation. Models AP1280 and AP1290 use an 11-pin base, either molded socket (M011) or DIN rail socket (MD11).

### Ordering Information

#### Specify:

- Model: **AP1280, AP1290**
- Options: U, P (see text)
- Line Power (see specs.)  
(All power supplies are transformer-isolated from the internal circuitry.)

## Pin Connections

AP1280, AP1290

- 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

DC Power: Pin 1 = (+); Pin 3 = (-)

Key:

N.O. = Normally Open

C = Common

N.C. = Normally Closed

DC Power: Pin 1 = (+)

Pin 3 = (-)

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

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