# RTD or Thermistor Input Alarm Trips

# APD 1400, APD 1420, APD 1430

**Input:** 2 or 3 Wire RTD or Thermistor
**Output:** Two 8 Amp Relays

- *Switch Selectable Relay Configuration*
- *Removable Plugs for Faster Installation*
- *Input LoopTracker® and Alarm Status LEDs*
- *Full 1200 V Isolation*
- *Alarm Test / Reset Button*
- *RTD Leadwire Compensation*

## Applications

- *Process Limit Alarm*
- *Monitor, Heaters, Refrigerators, Ovens*
- *Temperature Over, Under, Out-of-Range Alarm*

### Input

Factory Configured—Please specify the following or call us

RTD resistance at 0°C and curve (385, 3916, 392 etc.)
Typical RTDs: 10 Ω to 2000 Ω RTDs including
100 Ω 0.00385 DIN, 100 Ω 0.003916, 100 Ω 0.00392,
10 Ω Cu, 1000 Ω Ni-Fe, 120 Ω Ni

Thermistor: Type (NTC, PTC) and temperature curve data

Temperature Range: in °F or °C

100°F (55°C) is the recommended minimum span. Consult factory if a smaller span is required.

### RTD Typical Excitation Current

| | | | |
|---|---|---|---|
| 10 Ω: | 10 mA | 100 Ω: | 2 mA |
| 1000 Ω: | 0.5 mA | 2000 Ω: | 0.2 mA |

### Leadwire Compensation

< ±0.05% of span per 1 Ω change in leadwire resistance

### Isolation

1200 V isolation: power to input
750 $VAC_p$ or 750 VDC common mode protection

### LoopTracker

Variable brightness LED indicates input level and status

### APD 1400 Relay Output

Single setpoint dual SPDT Form C contact sets
Standard: HI alarm, non-latching, normal acting
Options: LO alarm, latching, reverse acting

### APD 1420 Relay Output

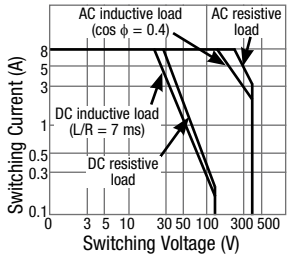
2 independent setpoint SPDT Form C contact sets
Standard: HI/LO alarm, non-latching, normal acting
Options: LO/LO, HI/HI, LO/HI alarms, latching, reverse acting

### APD 1430 Relay Output

2 independent setpoint SPDT Form C contact sets
Standard: Band alarm (both alarms trip if outside LO and HI trip points), non-latching, normal acting
Options: Inverse band alarm, latching, reverse acting

### Relay Contact Ratings

8 A max @ 240 VAC resistive load
External contact protection such as an RC snubber is recommended for inductive loads




### Setpoint

12 turn potentiometer adjustable from 0 to 100% of span

### Deadband

12 turn potentiometer adjustable from 1 to 100% of span

### Response Time

70 milliseconds typical

### Functional Test/Reset Button

Front button or external contact closure toggles relays to opposite state when pressed.
Resets latching relay if latching relay mode is ordered




### Dimensions

0.89" W x 4.62" H x 4.81" D
(22.5 x 117 x 122 mm)
Height includes connectors

### Ambient Temperature Range and Stability

–10°C to +60°C operating ambient
Better than 1% of span over operating temperature range
Better than 0.014% of span per °C

### Housing

Mounts to standard 35 mm DIN rail
IP 40

### Connectors

Four 4-terminal removable connectors
14 AWG max wire size

### Power

80-265 VAC, 50/60 Hz or 48-300 VDC, 2 W maximum
D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 2 W maximum

### Description

The APD 1400, 1420, and 1430 accept an RTD or thermistor temperature input and provide a visual alarm indication and alarm relay contact outputs. 8 amp relay contacts allow the module to directly control high capacity loads.

The input type, range, and alarm types are factory configured. Front-accessible potentiometers are used to adjust each alarm setpoint and deadband.

### LoopTracker and Alarm Status LEDs

API exclusive features include a LoopTracker LED that varies in intensity with changes in the process input signal. A red/green bi-color alarm status LED (two on the APD 1420 and 1430) visually indicate alarm status. These LEDs provide a quick visual picture of your process at all times.

### Output Test / Unlatch

API's exclusive functional test button can be used to verify the alarm and system operation and also provides the additional function of unlatching the alarm when the latching option has been ordered. This feature can be remotely operated.

The output test button greatly aids in saving time during initial startup and/or troubleshooting.

| Model | Input | Standard Alarm Configuration | Power |
|---|---|---|---|
| APD 1400 | Factory ranged, specify: Sensor type Calibration curve Temperature range in °F or °C | Single setpoint dual SPDT relays HI alarm, non-latching, normal acting | 80-265 VAC or 48-300 VDC |
| APD 1400 D | | | 9-30 VDC or 10-32 VAC |
| APD 1420 | | 2 setpoints, 2 SPDT relays HI/LO alarms, non-latching, normal acting | 80-265 VAC or 48-300 VDC |
| APD 1420 D | | | 9-30 VDC or 10-32 VAC |
| APD 1430 | | 2 setpoints, 2 SPDT relays Band alarm, non-latching, normal acting | 80-265 VAC or 48-300 VDC |
| APD 1430 D | | | 9-30 VDC or 10-32 VAC |

**Alarm Options—add to end of model number**

**L** APD 1400 with LO trip. Alarm trips on decreasing signal.

**HH** APD 1420 with HI/HI trip. Alarms trip at their respective trip points on increasing signal.

**LL** APD 1420 with LO/LO trip. Alarms trip at their respective trip points on decreasing signal.

**LH** APD 1420 with LO/HI trip. Alarm 1 trips on decreasing signal. Alarm 2 trips on increasing signal.

**IB** APD 1430 with Inverse Band alarm. Both alarms trip if signal is between LO and HI trip points.

**HT** Latching alarm with push button reset

**HP** Latching alarm with power-off reset. Module power must be turned off to reset alarms

**R** Reverse-acting alarms. Relay coils energized in an alarm condition. No alarm condition with module power off.

**U** Conformal coating for moisture resistance

**Accessories—order as separate line item**

**API TK36** DIN rail, 35 mm W x 39" L, aluminum

**API BP4** Spare removable 4 terminal plug, black

### Electrical Connections

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. See diagram below for terminal designations and wiring examples. Consult factory for assistance.

Avoid shock hazards! Turn power off to signal input, relay wiring, and module power before connecting or disconnecting wiring.

### Module Power Terminals

Check model/serial number label for module operating voltage to make sure it matches available power.

When using DC power, either polarity is acceptable, but for consistency with similar API products, positive (+) can be wired to terminal 13 and negative (–) can be wired to terminal 16.

### Input

The sensor type and temperature range are factory configured. See the model/serial number label for module information, sensor type, temperature range and options.

Temperature sensor inputs are connected as shown in the wiring diagrams below.

### Alarm Types

Note that the deadband is symmetrical about the setpoint; relay trip and reset points will both change if either the setpoint or deadband are changed.

High Alarm (default, H, or HH): The alarm relay changes state when the temperature exceeds the deadband trip point. The relay resets when the temperature drops below the deadband reset point. For a high alarm, the trip point is above the reset point.

Low Alarm (L or LL): The alarm relay changes state when the temperature goes below the deadband trip point. The relay resets when the temperature exceeds the deadband reset point. For a low alarm the trip point is below the reset point.

Band Alarm: Both alarm relays change state when the temperature is outside either deadband trip point.

Inverse Band Alarm (IB): The alarm relay changes state when the temperature is inside either deadband trip point.

HT: Latching alarm with push button reset

HP: Latching alarm with power-off reset. Module power must be turned off to reset alarms

R: Reverse-acting alarms. Relay coils energized in an alarm condition. No alarm condition with module power off.

### Relay Output Terminals

See wiring diagrams below right for connections. APD modules do not provide power to the relay contacts. Inductive loads (motors, solenoids, contactors, etc.) will greatly shorten relay contact life unless an appropriate RC snubber is installed.

The APD 1400 operates two sets of relays in unison with a single setpoint. The dual SPDT contact sets are in a Form C configuration.

The APD 1420 operates two sets of relays independently, each with its own setpoint. The dual SPDT contact sets are in a Form C configuration.

The APD 1430 operates two sets of relays, each with its own setpoint in a band alarm configuration. The dual SPDT contact sets are in a Form C configuration.

### Setup and Calibration

The input ranges are factory calibrated and do not require adjustment.

Relay operation is factory configured. See model/serial number label for relay configurations.

The Setpoint potentiometer allows the operator to adjust the level at which the alarm is activated. This control is adjustable from 0 to 100% of the input range.

The Deadband potentiometer allows the alarm trip and reset window to be adjusted symmetrically about the setpoint from 1 to 100% of the span. This allows the operator to fine tune the point at which the alarm trips and resets. The deadband is typically used to prevent chattering of the relays or false trips when the process signal is unstable or changes rapidly.

To calibrate the alarm section, set the deadband control to the minimum (counterclockwise). The deadband will be 1.0% of input span in this case.

Set the signal source to a reference that represents the desired trip point.

Adjust the setpoint control to the point at which the relay changes state form a non-alarm to an alarm condition.

If a larger amount of deadband is desired turn the deadband potentiometer clockwise. The deadband is symmetrical about the setpoint; both transition points will change as deadband is increased.

Relay set and reset points will both change if the setpoint or deadband are changed. Alternately set the setpoint and deadband until the desired trip and rest points are set.

### Output Test Function

When the front test button is depressed it will drive the relays to their opposite state. A customer-supplied switch connected to terminal 4 and 8 can also be used to toggle the relays. When released, the relays will return to their prior states.

This can be used as a diagnostic aid during initial start-up or troubleshooting, or as a manual over-ride function. The Test button also resets the relays on models with the HT option.

### Operation

The green LoopTracker® input LED provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum.

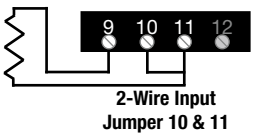
If the LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

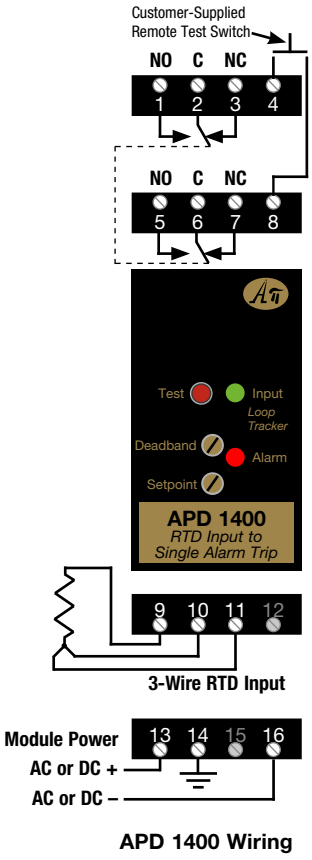
The bi-color alarm LED provides a visual indication of the alarm status. In all configurations, a green LED indicates a non-alarm condition and a red LED indicates an alarm condition.

In the normal mode of operation, the relay coil is energized in a non-alarm condition and de-energized in an alarm condition. This will create an alarm condition if the module loses power. For a normal acting, non-latching configuration, the alarm will activate when the input signal exceeds the setpoint (HI alarm) or falls below the setpoint (LO alarm), then will automatically reset when the alarm condition no longer exists.

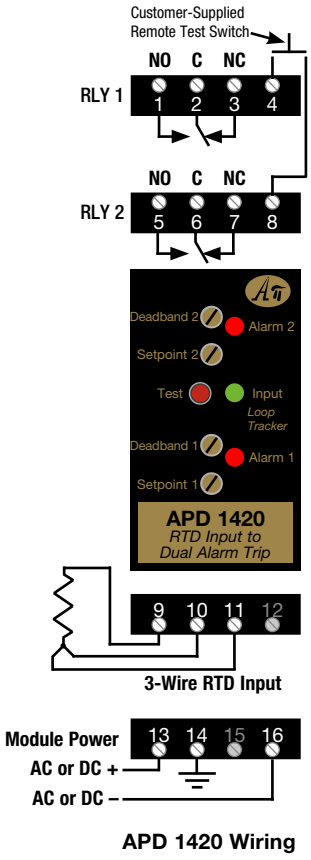
For a reverse acting alarm, the relay coil is de-energized in a non-alarm condition and energized in an alarm condition. The alarm activates when the input signal exceeds the setpoint (HI alarm) or falls below the setpoint (LO alarm), then automatically resets when the alarm condition no longer exists.

For models with the latching relay option, it will be necessary to push the Test button or remove power from the module to reset the alarm, depending on the type of latching option. The alarm will only reset if the alarm condition no longer exists.

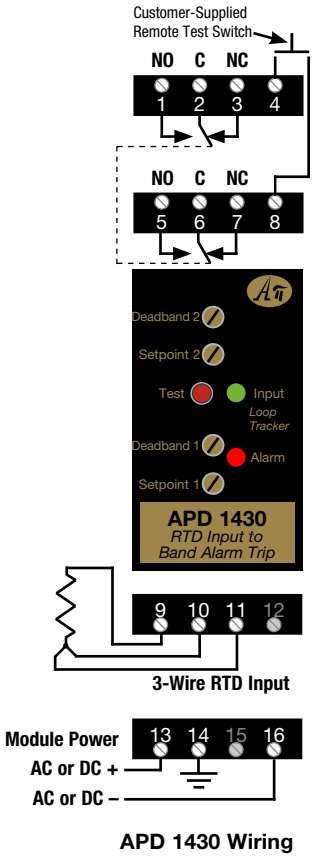



APD 1400 Wiring




APD 1420 Wiring




APD 1430 Wiring

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. Consult factory for your specific requirements.