

**Input:** 0-50 mV to ±10 VDC, 0-1 mA to 4-20 mA DC

**Output:** Two 8 Amp DPST Relays

- One Minute Setup for 24 Input Ranges
- Switch Selectable Relay Configuration
- Adjustable Setpoint and Deadband Potentiometers
- Input LoopTracker® and Alarm Status LEDs
- Full 1200 V Isolation
- Alarm Test / Reset Button
- Built-In Loop Power Supply for Sink/Source Input

**Applications**

- Process Limit Backup Alarm
- Tank Level Alarm
- Process Signal Over, Under, Out-of-Range Alarm

**DC Input Ranges**

24 field selectable ranges via switch settings  
See chart on other side, consult factory for special ranges  
Voltage: 0-50 mVDC to 0-10 VDC  
Bipolar Voltage: ±5 VDC or ±10 VDC  
Current: 0-1 mA DC to 0-20 mA DC, 4-20 mA DC

**Input Impedance and Burden**

Voltage: 250 kΩ minimum  
Current: 50 Ω typical  
Voltage burden: 1 VDC at 20 mA current input

**Isolation**

Power to input isolation: 1200 V  
Common mode protection: 600 VAC<sub>p</sub> or 600 VDC

**Input Loop Power Supply**

15 VDC ±10%, regulated, 25 mA DC, max. ripple, <10 mVrms  
May be selectively wired for sinking or sourcing mA input

**LoopTracker**

Variable brightness LED indicates input loop level and status

**APD 1080 Relay Output**

Single setpoint dual DPST contact sets, field configurable  
2 Form A (NO) and 2 Form B (NC) contact sets (8 terminals)  
May be field wired for Form C operation

**APD 1090 Relay Output**

2 independent setpoint DPST contact sets, field configurable  
SP 1: Form A (NO) and Form B (NC) contacts (4 terminals)  
SP 2: Form A (NO) and Form B (NC) contacts (4 terminals)  
May be field wired for Form C operation

**Relay Contact Ratings**

8 A @ 240 VAC resistive load  
5 A @ 240 VAC inductive load (cos φ = 0.4)  
8 A @ 30 VDC resistive load  
3.5 A @ 30 VDC inductive load (L/R = 7ms)  
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

**Output Test/Reset Button**

Toggles relay to opposite state when pressed  
Resets latching relay if latching relay mode is selected

**Response Time**

70 milliseconds typical

**Ambient Temperature Range and Stability**

-10°C to +60°C operating ambient  
Better than 1% of span over operating temperature range  
Better than 0.02% of span per °C

**Power**

85-265 VAC, 50/60 Hz or 60-300 VDC, 2 W maximum  
D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 2 W maximum

**Housing and Connectors**

IP 40, requires installation in panel or enclosure  
For use in Pollution Degree 2 Environment  
Mount vertically to a 35 mm DIN rail  
Four 4-terminal removable connectors, 14 AWG max wire size

**Dimensions**

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

Removable Plugs

Field Configurable Alarm Action

Dual 8 Amp DPST Alarm Relays

Alarm Test Function

Selectable Input Ranges

Input LoopTracker LED

Alarm Status LED

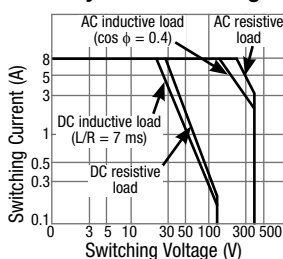
Adjustable Deadband and Setpoint

Universal Power



See Wiring Diagrams on Next Page

**Relay Contact Ratings**



File E145968  
85-265 VAC, 60-300 VDC  
model only



**Applications Link**  
[api-usa.com/apps](http://api-usa.com/apps)

**Free Factory I/O Setup!**

**Description**

The APD 1080 and APD 1090 accept a DC voltage or current input and provide visual alarm indication and alarm relay contact outputs. 15 voltage and 9 current input ranges can be field-configured via external rotary and slide switches. Offset ranges such as 1-5 VDC and 4-20 mA DC are also included.

Heavy-duty relay contacts allow the module to directly control high capacity loads. Front-accessible potentiometers are used to adjust the alarm setpoint from 0 to 100% and the deadband from 1 to 100%.

The APD 1080 provides a single setpoint adjustment of the two DPST relay contacts. The alarm output can be field configured for HI or LO operation, latching or non-latching, and normal or reverse acting.

The APD 1090 provides two setpoint adjustments of the two DPST relay contacts. The alarm outputs can be configured in the field for HI/HI, LO/LO, HI/LO or LO/HI operation, latching or non-latching, and normal or reverse acting. Deadband and alarm setpoints are independently adjustable for each alarm.

**How to Order**

**All models are field configurable**

Models can be pre-set to your specifications  
For APD 1090 specify if UL version is required  
Order D versions for operation on low voltage power

Model	Input	Output	Power
APD 1080	Field configurable—specify range	Single setpoint field configurable dual DPST	85-265 VAC or 60-300 VDC
APD 1080 D	if factory is to set switches	relays, specify configuration for factory setup	9-30 VDC or 10-32 VAC
APD 1090	Field configurable—specify range	2 setpoint field configurable 2 DPST relays,	85-265 VAC 60-300 VDC
APD 1090 D	if factory is to set switches	specify configuration for factory setup	9-30 VDC or 10-32 VAC

**Option—add to end of model number**

U Conformal coating for moisture resistance

**Sink/Source Input and Loop Supply**

For maximum versatility, a current input can be selectively wired for sinking or sourcing. This allows the APD 1080 and APD 1090 to work with powered or unpowered mA inputs. A regulated 15 VDC loop excitation supply can be used to power passive input devices eliminating the need for an additional DC loop supply.

**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 1090) visually indicate alarm status. These LEDs provide a quick visual status of your process at all times.

**Output Test / Unlatch**

API's exclusive Output 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 mode has been selected. The output test button greatly aids in saving time during initial startup and/or troubleshooting.

**Free factory setup. Please specify on your order**

Input range  
Setpoint  
Deadband  
Relay configuration

**Accessory—order as separate line item**

API BP4 Spare removable 4 terminal plug, black

## Precautions

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

**WARNING!** Avoid shock hazards! Turn signal input, output, and power off before connecting or disconnecting wiring, or removing or installing module.

## Précautions

**ATTENTION!** Tout le câblage doit être effectué par un électricien ou ingénieur en instrumentation qualifié. Voir le diagramme pour désignations des bornes et des exemples de câblage. Consulter l'usine pour assistance.

**ATTENTION!** Éviter les risques de choc! Fermez le signal d'entrée, le signal de sortie et l'alimentation électrique avant de connecter ou de déconnecter le câblage, ou de retirer ou d'installer le module.

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. See [api-usa.com](http://api-usa.com) for latest product information. Consult factory for your specific requirements.

**WARNING:** This product can expose you to chemicals including nickel, which is known to the State of California to cause cancer or birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

## Electrical Connections

See wiring diagrams. Observe input polarity. If the module does not function, check all wiring and polarity.

\* Do not make any connections to unused terminals or use them as wiring junctions for external devices. This may cause permanent damage to the module!

## Range Selection

Select ranges before installation. See the model/serial number label for module information, options, or if a custom range was specified. Set input selector switch A to "I" for a current input or to "V" for a voltage input. Switch settings B and C determine the input range. Switch D determines the alarm configuration.

Input Range	Switch ABC	APD 1080 Alarm Settings				
		SP1	Latch	Action	D	
0-50 mV	V 8 1	HI	No	Normal	2	
0-100 mV	V 9 1	HI	No	Reverse	6	
0-200 mV	V A 1	HI	Yes	Normal	0	
0-250 mV	V C 1	HI	Yes	Reverse	4	
0-400 mV	V B 1	LO	No	Normal	3	
0-500 mV	V O 1	LO	No	Reverse	7	
0-1 V	V 1 1	LO	Yes	Normal	1	
0-2 V	V 2 1	LO	Yes	Reverse	5	
0-2.5 V	V 4 1					
APD 1090 Alarm Settings						
SP1	SP2	Latch	Action	D		
0-4 V	V 3 1	HI	LO	No	Normal	A
1-5 V	V 3 F	HI	LO	No	Reverse	E
0-5 V	V 5 1	HI	LO	Yes	Normal	8
0-10 V	V 6 1	HI	LO	Yes	Reverse	C
±5 V	V 6 4	HI	HI	No	Normal	2
±10 V	V 7 4	HI	HI	No	Reverse	6
0-1 mA	I C 1	HI	HI	Yes	Normal	0
0-2 mA	I O 1	HI	HI	Yes	Reverse	4
0-4 mA	I 1 1	LO	LO	No	Normal	B
0-8 mA	I 2 1	LO	LO	No	Reverse	F
2-10 mA	I 2 F	LO	LO	Yes	Normal	9
0-10 mA	I 4 1	LO	LO	Yes	Reverse	D
0-16 mA	I 3 1	LO	HI	No	Normal	3
4-20 mA	I 3 F	LO	HI	No	Reverse	7
0-20 mA	I 5 1	LO	HI	Yes	Normal	1
		LO	HI	Yes	Reverse	5

## Input

Your input ranges, if specified on your order, is factory pre-configured (at 24°C ±1°C). Polarity must be observed for input wiring connections. If the module does not function, check switch settings and wiring polarity. Inputs are connected as shown in the table below.

A milliamp input can be wired for sinking or sourcing. Determine if your milliamp transmitter provides power to the current loop or if it must be powered by the module. Only one device must provide power to the current loop.

Type of Input Device	- Terminal	+ Terminal
Voltage output sensor or transmitter.	9 (-)	11 (+)
mA (current) output transmitter that provides power to the current loop. Typically a 3 or 4-wire device.	9 (-)	11 (+)
Unpowered mA (current) output transmitter. Typically a 2-wire device. APD module provides loop power.	11 (-) Signal	10 (+15 V) Power

## Relay Output Terminals

See wiring diagrams 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 1080 operates two sets of relays in unison with a single setpoint. The dual DPST contact sets are in a Form A (NO) and a Form B (NC) configuration. They may be field wired for Form C operation as required.

The APD 1090 operates two sets of relays independently, each with its own setpoint. The two DPST contact sets are in a Form A (NO) and a Form B (NC) configuration. They may be field wired for Form C operation as required.

## Module Power

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.

## Mounting to a DIN Rail

Install module vertically on a 35 mm DIN rail in a protective enclosure away from heat sources. Do not block air flow. Allow 1" (25 mm) above and below housing vents for air circulation.

1. Tilt front of module downward and position against DIN rail.
2. Clip lower mount to bottom edge of DIN rail.
3. Push front of module upward until upper mount snaps into place.

## Removal

1. Push up on the bottom back of the module.
2. Tilt front of module downward to release upper mount from top edge of DIN rail.
3. The module can now be removed from the DIN rail.

## Setpoint and Deadband Adjustments

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).

Set the signal source to a reference equal to the desired trip point.

Adjust the setpoint control to the point at which the relay changes state from a non-alarm to an alarm condition. The deadband will be 1.0% of span in this case.

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.

The adjustment procedure needs to be repeated any time switch settings are changed.

## Output Test Function

When the test button is depressed it will drive the relays to their opposite state. This can be used as a diagnostic aid during initial start-up or troubleshooting. When released, the relays will return to their prior states.

## 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.

When the latching mode is selected, it will be necessary to push the Output Test button or remove power from the module to reset the alarm. The alarm will only reset if the alarm condition no longer exists.

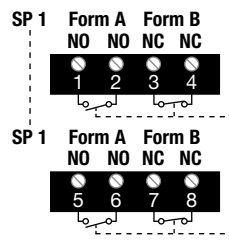


Wire terminal torque  
0.5Nm to 0.6Nm  
(4.4 to 5.3 in-lbs)

\* Do not make connections to unused terminals!

To maintain full isolation avoid combining power supplies in common with input, output, or unit power.

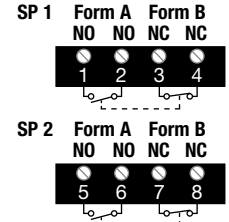
## Relay Wiring APD 1080



Jumper 2 & 3 for Form C operation

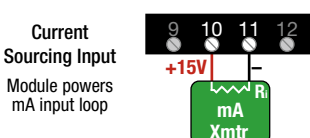
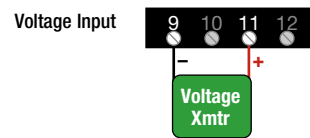
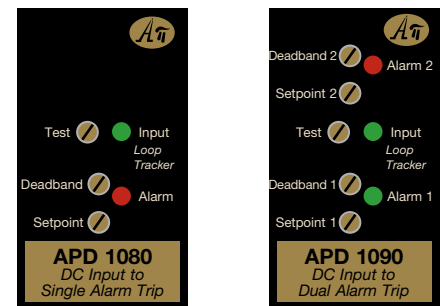
Jumper 6 & 7 for Form C operation

## Relay Wiring APD 1090

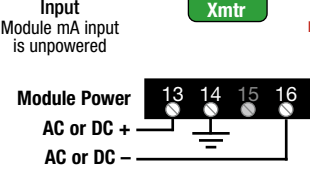
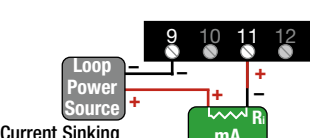


Jumper 2 & 3 for Form C operation

Jumper 6 & 7 for Form C operation



mA input: determine if transmitter has a passive or powered output. The module can be wired for a sinking or sourcing mA input.



\* Do not make connections to unused terminals!

Cu 60/75°C conductors  
14 AWG max.