DC Input Alarm Trips, Field Configurable, Isolated

APD 1080, APD 1090

Input: 0-50 mV to ±10 VDC, 0-1 mA to 4-20 mADC
Output: Two 8 Amp DPST Relays

- *One Minute Setup for 24 Input Ranges*
- *Switch Selectable Relay Configuration*
- *Removable Plugs for Faster Installation*
- *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*

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 mADC to 0-20 mADC, 4-20 mADC

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

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

Input Loop Power Supply
15 VDC ±10%, regulated, 25 mADC
Max. ripple, less than 10 mV_{RMS}
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

Response Time
70 milliseconds typical

Functional Test/Reset Button
Toggles relay to opposite state when pressed
Resets latching relay if latching relay mode is selected

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

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

Housing
Mounts to standard 35 mm DIN rail
IP 40

Connectors
Four 4-terminal removable connectors
14 AWG max wire size



Removable Plugs

Actual Size

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

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 mADC 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. Deadband control can be adjusted from 1 to 100% and the alarm setpoint from 0 to 100%.

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.

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 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 mode has been selected.

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

How to Order

All models are field configurable
Models can be pre-set to your specifications.
Order D versions for operation on low voltage power.

Please specify
Model
Input range, if factory is to pre-set
Setpoint, deadband, relay configuration, if factory is to pre-set
Options as required

Model	Input	Output	Power
APD 1080	Field configurable—specify range if factory is to set switches	Single setpoint field configurable dual DPST relays, specify configuration for factory setup	80-265 VAC or 48-300 VDC
APD 1080 D			9-30 VDC or 10-32 VAC
APD 1090	Field configurable—specify range if factory is to set switches	2 setpoint field configurable 2 DPST relays, specify configuration for factory setup	80-265 VAC or 48-300 VDC
APD 1090 D			9-30 VDC or 10-32 VAC

Option–add to end of model number
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

Range Selection

It is generally easier to 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 D determine the input range. Switch D determines the alarm configuration.

Input Range	Switch A B C
0-50 mV	V 8 1
0-100 mV	V 9 1
0-200 mV	V A 1
0-250 mV	V C 1
0-400 mV	V B 1
0-500 mV	V 0 1
0-1 V	V 1 1
0-2 V	V 2 1
0-2.5 V	V 4 1
0-4 V	V 3 1
1-5 V	V 3 F
0-5 V	V 5 1
0-10 V	V 6 1
±5 V	V 6 1
±10 V	V 7 4
0-1 mA	I C 4
0-2 mA	I 0 1
0-4 mA	I 1 1
0-8 mA	I 2 1
2-10 mA	I 2 F
0-10 mA	I 4 1
0-16 mA	I 3 1
4-20 mA	I 3 F
0-20 mA	I 5 1

APD 1080 Alarm Settings

SP1	Latch	Action	D
HI	No	Normal	2
HI	No	Reverse	6
HI	Yes	Normal	0
HI	Yes	Reverse	4
LO	No	Normal	3
LO	No	Reverse	7
LO	Yes	Normal	1
LO	Yes	Reverse	5

APD 1090 Alarm Settings

SP1	SP2	Latch	Action	D
HI	LO	No	Normal	A
HI	LO	No	Reverse	E
HI	LO	Yes	Normal	8
HI	LO	Yes	Reverse	C
HI	HI	No	Normal	2
HI	HI	No	Reverse	6
HI	HI	Yes	Normal	0
HI	HI	Yes	Reverse	4
LO	LO	No	Normal	B
LO	LO	No	Reverse	F
LO	LO	Yes	Normal	9
LO	LO	Yes	Reverse	D
LO	HI	No	Normal	3
LO	HI	No	Reverse	7
LO	HI	Yes	Normal	1
LO	HI	Yes	Reverse	5

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 white 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.

Signal Input Terminals

Polarity must be observed for input wiring connections. If the input does not function, check switch settings and wiring polarity.

Voltage inputs are connected as shown in the table below.

The input can be used with either sinking or sourcing milliamp devices. Only one device must provide power to the current loop.

For a transmitter with a current output, determine if it provides power to the current loop or if it must be powered by the APD module. Use a multi-meter to check for voltage at the transmitter's output terminals. Typical voltage may be in the range of 9 to 24 VDC. In this case, wire the device to terminals 9 and 11.

Type of Input Device	– Terminal	+ Terminal
Sensor or transmitter with a voltage output.	9 (–)	11 (+)
Transmitter with a mA (current) output that provides power to the current loop. Typically a 3 or 4-wire device.	9 (–)	11 (+)
Transmitter with mA (current) output that is unpowered. Typically a 2-wire device. APD module provides loop power.	11 (–) Signal	10 (+15 V) Power

Relay Output Terminals

See wiring diagrams below 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.

Setup and Calibration

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

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 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. 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.

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.

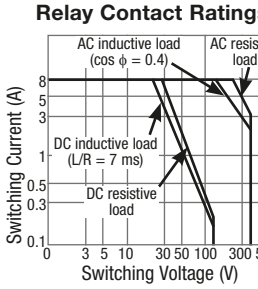
In the normal mode of operation, the relay coil is energized in a non-alarm condition and de-energized in an alarm condition. This will create an alarm condition if the module loses power. For a normal acting, non-latching configuration, the alarm will activate when the input signal exceeds the setpoint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

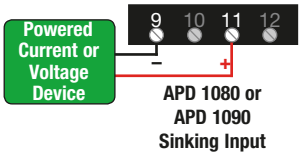
For a reverse acting alarm, the relay coil is de-energized in a non-alarm condition and energized in an alarm condition. The alarm activates when the input signal exceeds the setpoint (HI alarm) or falls below the setpoint (LO alarm), then automatically resets when the alarm condition no longer exists.

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

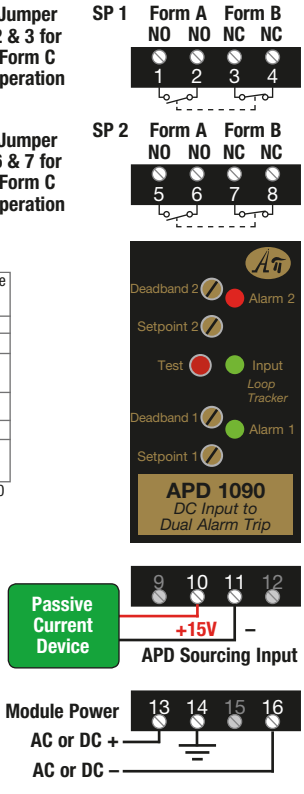


APD 1080 Wiring





APD Sinking Input Wiring



APD 1090 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.