

# DC Input Dual Alarm Trip, Field Configurable API 1090 DIN, 1090 DD



**Input:** 0-50 mV to  $\pm 10$  VDC or 0-1 mA to 4-20 mA  
**Outputs:** Two 7 Amp SPDT Relays

**Field Selectable**  
**One Minute Setup!**



- Field Selectable Input Ranges
- Selectable Relay Configuration & Adjustable Setpoints
- Input LoopTracker® & Alarm Status LEDs
- Alarm Test/Reset Pushbutton
- Built-In 4-20 mA Loop Power Supply
- Compact 22.5 mm Wide DIN Package
- Operates on Wide Ranges of AC or DC Power



## Applications

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

## Specifications

### Input Ranges

	Minimum	Maximum
Voltage:	0-50 mVDC	$\pm 10$ VDC
Current:	0-1 mA DC	0-20 mA DC

See chart on other side for standard ranges  
 Consult factory for other available switch selectable ranges

### Input Impedance

Voltage inputs: 250 k $\Omega$  minimum  
 Current inputs: 50  $\Omega$  typical

### Input Voltage Burden

1.0 VDC typical at 20 mA

### Input Protection, Common Mode

750 VDC or 750 VAC<sub>p</sub>

### Input Loop Power Supply

12 VDC  $\pm 10\%$ , regulated, 25 mA max. Max. ripple < 1.5 V<sub>p-p</sub>

### LoopTracker

Variable brightness LED indicates input loop level and status

### Relay Output

Two SPDT relays, field configurable  
 7 A @ 240 VAC resistive load  
 3.5 A @ 240 VAC inductive load  
 8 A @ 30 VDC maximum

CAUTION: 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

Adjustable from 1.0 to 100% of span, 12 turn potentiometer

### Functional Test/Reset Button

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

### Response Time

70 milliseconds typical

### Ambient Temperature Range and Temperature Stability

-10°C to +60°C operating ambient  
 Better than  $\pm 0.02\%$  of span per °C temperature stability

### Case Material

Polycarbonate, gray UL #94V-1 housing and black UL #94V-2 terminals

### Power

**API 1090 DIN** Any AC source 80 to 265 VAC 50/60 Hz, 2 W max.  
 or any DC source 48 to 300 VDC, 2 W max.  
**API 1090 DD** 9 to 30 VDC, 2 W maximum



## Description and Features

The **API 1090 DIN** and **API 1090 DD** accept a DC voltage or current input and two independent SPDT alarm outputs via relay contacts when the input exceeds a high alarm trip point or falls below a low alarm trip point. 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. Consult the factory for other available ranges.

API exclusive features include a **LoopTracker** LED that varies in intensity with changes in the process signal, a bi-color alarm status LED, and a **Functional Test Pushbutton** to toggle the relays independent of the input. The green LoopTracker LED varies in intensity with changes in the process input signal. Monitoring the state of this LED can provide a quick visual picture of your process loop at all times. The functional test pushbutton 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.

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

Also standard on the **API 1090 DIN** and **API 1090 DD** is a 12 VDC regulated loop excitation supply. This supply can be used to power passive input devices, often eliminating the need for an additional external power supply.

The **API 1090 DIN** and **API 1090 DD** are designed to mount on an industry-standard DIN rail. The narrow 22.5 mm wide DIN style housing allows for side-by-side mounting of multiple modules for maximum I/O density.

## Models, Options & Accessories

*Free Setup—Specify input range and output range*

**API 1090 DIN** Field rangeable DC input alarm trip, 2 SPDT relays, with loop power supply, 80-265 VAC or 48-300 VDC

**API 1090 DD** Field rangeable DC input alarm trip, 2 SPDT relays, with loop power supply, 9-30 VDC

*Options—Add to end of model number*

**U** Conformal coating for moisture resistance

*Accessories—Order as a separate line item*

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



# API 1090 DIN, API 1090 DD Installation and Setup

## ELECTRICAL CONNECTIONS

**WARNING!** All wiring must be performed by qualified personnel only. This module requires an industry-standard DIN rail mount. Order API TK36 DIN rail separately.

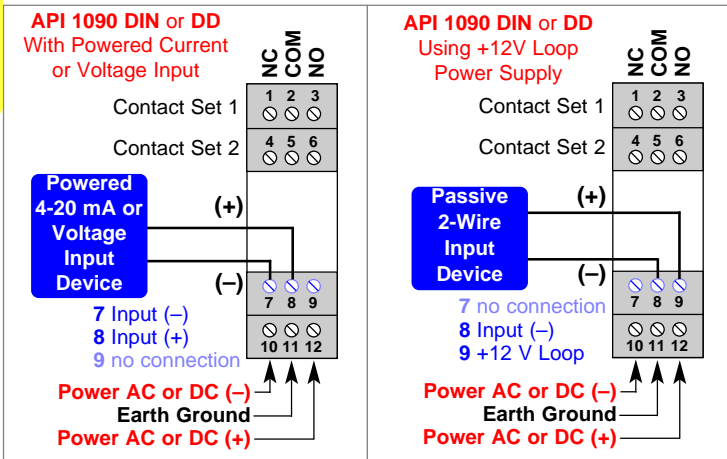
**Power Input Terminals** – API module power requirements are indicated on the side label. Connect power to terminals 10 and 12. For DC powered modules, polarity MUST be observed. Positive (+) is wired to terminal 12 and negative (-) is wired to terminal 10. Terminal 11 earth ground may be used if required.

**Powered Signal Input** – Polarity must be observed when connecting the signal input. The positive signal (+) is connected to terminal 8 and the negative (-) is connected to terminal 7.

**Using the 12 VDC Power Supply with a Passive Signal Input** – This may save the expense of purchasing a separate power supply for the input device. A passive input device can be powered by the 12 volt DC power supply at terminal 9. Polarity must be observed when connecting the signal input. Typically, the positive (+) lead is wired to terminal 9 and the negative (-) lead is connected to terminal 8. A typical example is shown. It is very important to consult the manufacturer of your specific sensor to determine its compatibility and proper wiring.

**Relay Output Terminals** – Terminals 1, 2, 3 and 4, 5, 6 provide the appropriate connections for the desired relay operations. (NC = Normally Closed, C = Common, NO = Normally Open).

## WIRING EXAMPLES



## RANGE SELECTION

The API 1090 DIN input selector switch determines the input impedance for the module, typically 50 Ω for current inputs and 250 kΩ or greater for voltage inputs. The switch settings will determine the exact operation of the module. Following are the standard input range and alarm configuration tables used to configure the API 1090 DIN. Set switches A, B, C and D accordingly.

**EXAMPLE:** For 4-20 mADC input, HI alarm, non-latching, normal action set switches as follows: A = I (current) B = 5 C = F D = 6

VOLTAGE Inputs Set switch A to "V"		CURRENT Inputs Set switch A to "I"		ALARM CONFIGURATION			
Range	Switches B C	Range	Switches B C	SP1/SP2	Latch	Action	Switch D
0-50 mV	8 1	0-1 mA	C 1	HI/LO	No	Normal	6
0-100 mV	9 1	0-2 mA	0 1	HI/LO	No	Reverse	E
0-200 mV	A 1	0-4 mA	1 1	HI/LO	Yes	Normal	2
0-250 mV	C 1	0-8 mA	2 1	HI/LO	Yes	Reverse	A
0-400 mV	B 1	2-10 mA	2 F	HI/HI	No	Normal	4
0-500 mV	0 1	0-10 mA	4 1	HI/HI	No	Reverse	C
±50 mV	A 4	0-16 mA	3 1	HI/HI	Yes	Normal	0
±100 mV	B 4	0-20 mA	5 1	HI/HI	Yes	Reverse	8
0-1 V	1 1	4-20 mA	5 F	LO/LO	No	Normal	7
0-2 V	2 1			LO/LO	No	Reverse	F
0-2.5 V	4 1			LO/LO	Yes	Normal	3
0-4 V	3 1			LO/LO	Yes	Reverse	B
1-5 V	5 F			LO/LO	Yes	Reverse	B
0-5 V	5 1			LO/LO	Yes	Reverse	B
0-10 V	6 1			LO/LO	Yes	Reverse	B
±5 V	6 4			LO/LO	Yes	Reverse	B
±10 V	7 4			LO/LO	Yes	Reverse	B

## SETUP

**Setpoint Control** – The multi-turn potentiometers (one for each setpoint) allow the operator to adjust the level at which each alarm is activated. These controls are adjustable from 0 to 100% of the input range.

**Deadband Control** – These potentiometers allow the alarm trip and reset windows to be adjusted symmetrically about the setpoint from 1 to 100% of the span for each setpoint. This allows the operator to fine tune the point at which each alarm trips and resets. It is typically used to prevent chattering of the relays or false trips when the process signal is unstable or changes rapidly.

**Test Switch** – The functional Test pushbutton toggles the alarm status independent of the input when depressed. It verifies the alarm and system operation without having to alter the input signal.

## OPERATION

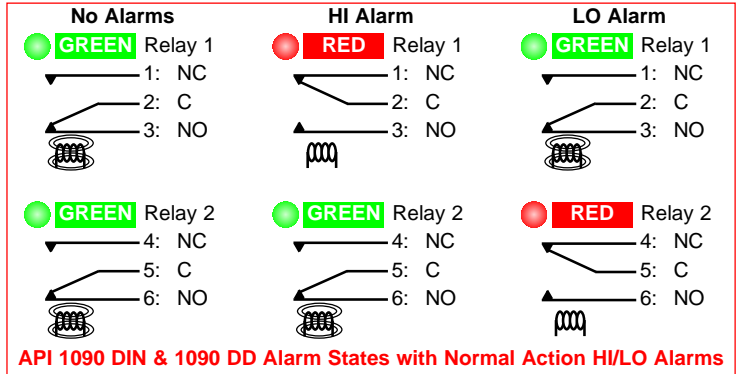
**GREEN LoopTracker® Input LED** – Provides a visual indication that a signal is being sensed by the input circuitry of the module. It indicates the input signal strength by changing in intensity as the process changes from minimum to maximum. If the LED fails to illuminate, or fails to change in intensity as the process changes, this may indicate a problem with module power or signal input wiring.

**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.

**Alarm Relays** – 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 pushbutton or remove power from the module to reset the alarm. The alarm will only reset if the alarm condition no longer exists.



## CALIBRATION

The input ranges are factory calibrated and no field calibration is required.

To calibrate the alarm section, set the deadband control to the minimum. 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 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, the deadband control may be increased by turning the control clockwise. The deadband is symmetrical about the setpoint; both transition points will change as deadband is increased. The test button can be used at any time to toggle the relay state independent of the input and the output to verify system operation.

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