

# DC Input Alarm Trips with Transmitter and Loop Supply

**Input:** 0-100 mV to 200 VDC, 0-1 mA to 0-50 mADC, 4-20 mADC  
**Outputs:** One 8 Amp SPDT Relay, 0-1 V to ±10 VDC, 0-2 mA to 0-20 mADC

- DC Input with Loop Supply
- Field Adjustable Setpoints
- Plug-In Design for Fast Installation
- Input LoopTracker® and Alarm Status LEDs
- Alarm Test, Optional Reset Button
- Optional 0-1 V Setpoint Retransmission Output

## Applications

- Process Signal Retransmission with Alarm
- Alarm and Rescale a Process Signal

## DC Input Range

Factory configured, please specify input range  
 Voltage: 0-100 mVDC to 0-200 VDC  
 Bipolar voltage: ±100 mVDC to ±10 VDC  
 Current: 0-1 mADC to 0-50 mADC

## Input Impedance and Burden

Voltage: 250 kΩ minimum  
 Current: 50 Ω typical (1 VDC burden at 20 mA)

## Isolation and Input Protection

750 VAC<sub>p</sub> or 750 VDC common mode protection  
 Input isolated from power supply

## Input Loop Power Supply

18 VDC unregulated, 25 mADC, <1.5 V<sub>p-p</sub> ripple  
 May be selectively wired for sinking or sourcing mA input

## LoopTracker

Variable brightness LED indicates input loop level and status

## DC Output Range

Factory configured, please specify output range  
 Voltage: 0 to 1 VDC to ±10 VDC  
 Current: 0 to 2 mA to 0 to 20 mA  
 20 V compliance, 1000 Ω at 20 mA

## Output Calibration

Multi-turn zero and span potentiometers, ±15% of span typ.

## Relay Output

One SPDT form C contact set  
 Factory configured alarm type  
 Standard: HI alarm, non-latching, normal acting  
 Options: LO alarm, latching, reverse acting

## Relay Contact Rating

8 A @ 240 VAC resistive load or 30 VDC resistive load  
 5 A @ 240 VAC inductive load (cos φ = 0.4)  
 3.5 A @ 30 VDC inductive load (L/R = 7ms)  
 Caution: Do not exceed socket voltage rating  
 Use an RC snubber for inductive loads

## Setpoint

One 12 turn potentiometer, 0-100% of span  
 SPR option: 0-1 V output of alarm setpoint

## Deadband

1.0 to 100% of span, 12 turn potentiometer  
 Alarm trip/reset window is symmetrical about the setpoint

## Output Test/Reset Button

Test button toggles relay to opposite state when pressed  
 HT option: Reset button resets latching relay

## Accuracy

±0.1% of span (includes adjustment resolution and linearity)

## Response Time

70 milliseconds typical

## Ambient Temperature Range and Stability

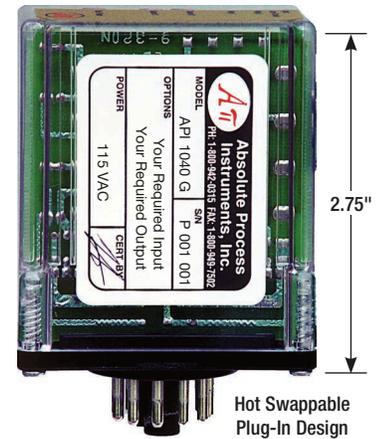
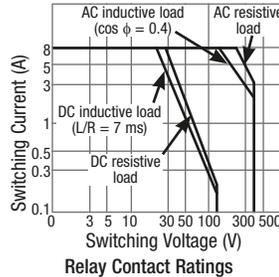
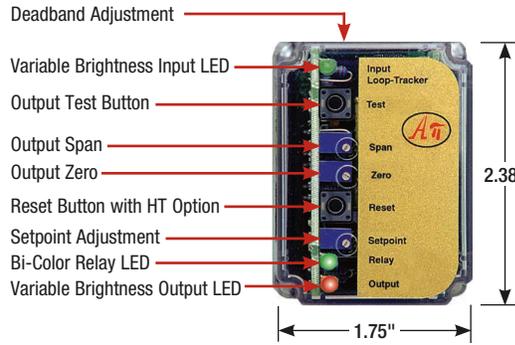
-10°C to +60°C operating ambient  
 Better than 0.02% of span per °C stability

## Housing and Sockets

IP 40, requires installation in panel or enclosure  
 API 011 or API 011 FS socket  
 Socket mounts to 35 mm DIN rail or can be surface mounted

## Power

Standard: 115 VAC ±10%, 50/60 Hz, 2.5 W max.  
 P option: 85-265 VAC 50/60 Hz, 60-300 VDC, 2.5 W typ.  
 A230 option: 230 VAC ±10%, 50/60 Hz, 2.5 W max.  
 D option: 9-30 VDC, 2.5 W typical



Quick Link  
[api-usa.com/1040](http://api-usa.com/1040)

Free Factory  
 I/O Setup!

## Description

The API 1040 G alarm/transmitter accepts a DC voltage or current input and provides both transmitter and alarm functions in one unit.

The API 1040 G also provides a linearly-transferred DC voltage or current output. The API 1040 G transmitter output is useful for signal scaling, or translation from current to voltage or vice-versa in applications that do not require isolation.

This module includes an unregulated 18 VDC loop excitation supply that can be used to power an external loop-powered transmitter or other passive input device eliminating the need for an additional DC loop supply.

The API 1040 G provides a visual alarm indication and an SPDT alarm relay output when the input exceeds a high alarm trip point or falls below a low alarm trip point.

The alarm output can be factory configured for HI or LO operation, non-latching or latching, normal or reverse acting. Top-accessible potentiometers are used to adjust the alarm setpoint and deadband. Heavy-duty relay contacts allow the module to directly control high capacity loads.

Model	Input	Output	Power
API 1040 G			115 VAC
API 1040 G A230	Factory ranged; specify mV, V, or mA range	Factory ranged; specify mV, V, or mA range. One SPDT relay, HI alarm, normal acting. Specify alternate alarm configurations and options	230 VAC
API 1040 G P			85-265 VAC or 60-300 VDC
API 1040 G D			9-30 VDC
API 1040 G SPR	Factory ranged; specify mV, V, or mA range	Factory ranged; specify mV, V, or mA range. One SPDT relay, HI alarm, normal acting. 0-1 V alarm setpoint retransmission. Specify alternate alarm configurations and options	115 VAC
API 1040 G A230 SPR			230 VAC
API 1040 G P SPR			85-265 VAC or 60-300 VDC
API 1040 G D SPR			9-30 VDC

## Options—add to end of model number

- L** LO trip. Alarm trips on decreasing signal.
- HT** Latching alarm with push button reset
- HP** Latching alarm with power-off reset  
Module power must be turned off to reset alarm
- 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 a separate line item

- API 011** 11-pin socket, DIN rail or surface mount
- API 011 FS** 11-pin finger safe socket, DIN rail or surface mount
- API CLP1** Module hold-down spring for high vibration or mobile applications



API 011 FS  
300 V Rating



API 011  
300 V Rating



API CLP1

**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.

**Socket and Mounting**

The module installation requires a protective panel or enclosure. Use API 011 or finger-safe API 011 FS socket. See specifications for maximum allowable socket voltages. Note that some relay sockets may have lower voltage ratings. The socket clips to a standard 35 mm DIN rail or can be attached to a flat surface using the two mounting holes.

**Signal Input**

The input range is factory calibrated and does not require adjustment. Polarity must be observed when connecting the signal input.

If your transmitter has a current output, determine if it provides power to the current loop or if it must be powered by the API module. Use a multi-meter to check for voltage at the transmitter output terminals. Typical voltage may be in the range of 9 to 24 VDC.

If your transmitter has a powered mA output, connect to terminals 4 and 5.

If your transmitter is a passive device it can be powered by the 18 Volt DC power supply at terminal 2. This may save the expense of purchasing a separate power supply for the input device. Connect to terminals 2 and 4.

Type of Input Device	- Terminal	+ Terminal
Sensor or transmitter with a voltage output.	5 (-)	4 (+)
Transmitter with a mA output that provides power to the current loop. Typically a 3 or 4-wire device.	5 (-)	4 (+)
Transmitter with mA output that is unpowered. Typically a 2-wire device. API module powers loop.	4 (-)	2 (+18 VDC)

**Relay Output Terminals**

See wiring diagram for connections. The module does 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.

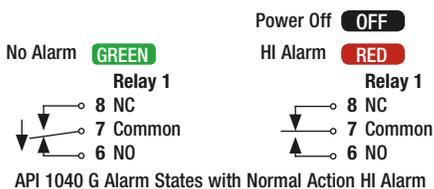
**Module Power**

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

When using DC power, polarity must be observed. The positive (+) must be wired to terminal 1 and negative (-) must be wired to terminal 3.

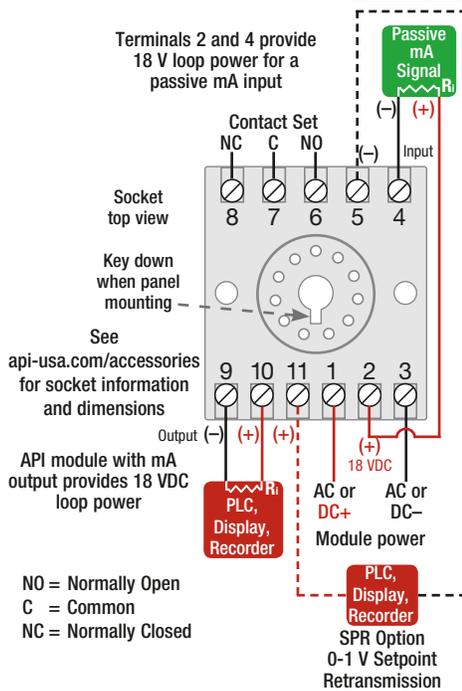
**Alarm Configuration**

The relay operation is factory configured. The default configuration is HI alarm normal acting. See model/serial number label for non-standard relay configuration options.



API 1040 G Alarm States with Normal Action HI Alarm

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. Contact factory for assistance and see [api-usa.com](http://api-usa.com) for latest datasheet version.



API 1040 G Using +18V Loop Power Supply

**Setpoint**

This multi-turn 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.

**Deadband**

The deadband potentiometer allows the alarm trip/reset window to be adjusted symmetrically about the setpoint from 1 to 100% of the span.

Deadband 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.

**Alarm Adjustments**

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 from 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.

Alternately set the setpoint and deadband until the desired trip/reset points are set.

**Output Test Function**

The functional test button toggles the alarm status independent of the input when depressed. It verifies the alarm and system operation. When released, the relay will return to its prior state. This can be used as a diagnostic aid during initial start-up or troubleshooting.

**Output Calibration**

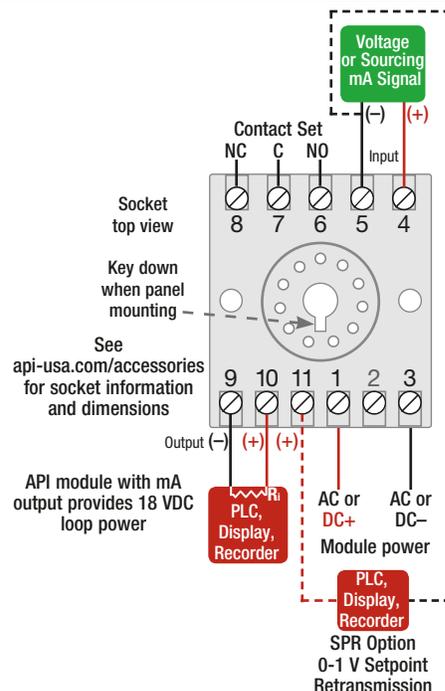
The top-mounted zero and span controls allow recalibration of the analog output if required. Calibration requires an accurate signal source and measuring equipment, such as an accurate digital voltmeter.

Set the signal source to the minimum desired input. Adjust the zero control for the minimum desired output. Set the signal source to the maximum desired input, adjust the span control for the maximum desired output. Repeat steps if necessary.

**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



API 1040 G with Powered Current or Voltage Input

process changes, check the module power or signal input wiring.

The red LoopTracker output LED provides a visual indication that the output signal is functioning. It becomes brighter as the input and the corresponding output change from minimum to maximum.

For current outputs, the LED will only light if the output loop current path is complete. For either current or voltage outputs, failure to illuminate or a failure to change in intensity as the process changes may indicate a problem with the module power or signal output 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.

**High Alarm (Standard)**

The alarm relay changes state when the input exceeds the deadband trip point. The relay resets when the input drops below the deadband reset point unless the module has a latching relay option. For a high alarm, the trip point is above the reset point.

**Low Alarm (L)**

The alarm relay changes state when the input goes below the deadband trip point. The relay resets when the input exceeds the deadband reset point unless the module has a latching relay option. For a low alarm, the trip point is below the reset point.

**HT Latching Alarm Option**

The module has a latching alarm with a push button reset. The Reset button or powering the module off can be used to reset the alarm provided the alarm condition no longer exists.

**HP Option**

The module has a latching alarm with a power-off reset. Module power must be turned off to reset alarms. The alarm will reset provided the alarm condition no longer exists.

**Normal Acting Alarms (Standard)**

Normal acting alarms energize the relay coils in a non-alarm condition and de-energize them in an alarm condition. This will create an alarm condition if the module loses power.

**Reverse Acting Alarms (R Option)**

Reverse-acting alarms energize the relay coils in an alarm condition and de-energize them in a non-alarm condition. There is no alarm condition with module power off.

**SPR Set Point Retransmission Option**

With the SPR option, a transmitted signal (0-1 VDC) indicates the value of the alarm setpoint. The output will track the adjustment of the alarm setpoint potentiometer.