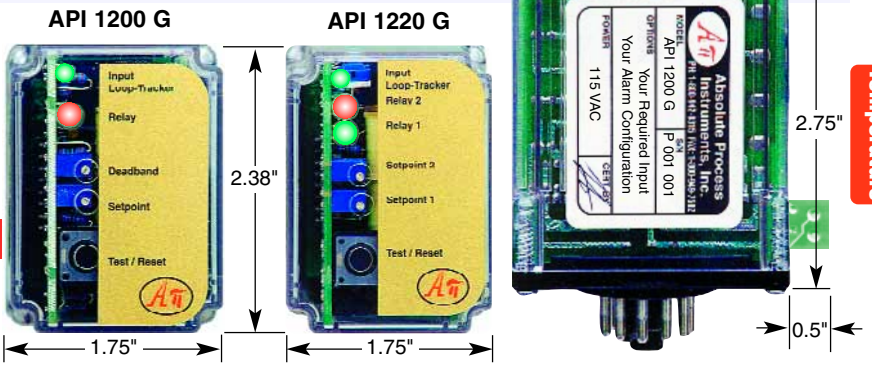
Thermocouple Alarm Trips
Field-Adjustable Setpoints

API 1200 G
API 1220 G

Input: ***Most Thermocouple Types***

Outputs: ***One DPDT Relay or Two SPDT Relays***

- ***Automatic Cold Junction Compensation***
- ***Field Adjustable Setpoints***
- ***High Capacity 7 Amp Relay Contacts***
- ***Input LoopTracker® & Alarm Status LEDs***
- ***Alarm Test/Reset Pushbutton***



Applications

- **Process Limit Backup Alarm**
- **Temperature Alarm**
- **Over, Under, Out-of-Range Alarm**

Specifications

Thermocouple Input

Factory Configured—Please specify thermocouple type and temperature range in °F or °C

J, K, T, E, R, S, and others; most thermocouple types available

Cold-Junction Compensation

Automatic for specified thermocouple

T/C Burn-Out Protection

Upscale burnout standard
Downscale burnout optional, add option **B** to end of model number

T/C Current

Less than 1.0 µA, including burnout sense

LoopTracker

Variable brightness LED indicates input loop level and status

Relay Output

Factory Configured—See Options for other relay configurations

API 1200 G	One DPDT contact set HI alarm, normal action (failsafe), non-latching standard 7 A @ 240 VAC resistive load 3.5 A @ 240 VAC inductive load
API 1220 G	Two SPDT contacts HI/LO, normal action (failsafe), non-latching standard 7 A @ 240 VAC resistive load 3.5 A @ 240 VAC inductive load
CAUTION:	Socket contacts may limit system rating. External contact protection such as an RC snubber is recommended for inductive loads.

Setpoint

12 turn potentiometer, adjustable 0 to 100% of span

Deadband

API 1200 G	1.0 to 100% of span 12 turn potentiometer
API 1220 G	Fixed at 1% of span, standard
API 1220 GA	1.0 to 100% of span 1 turn potentiometer

Functional Test/Reset Button

Toggle relay(s) to opposite state when pressed
Resets latching relay on API 1200 G with **HT** option

Response Time

70 milliseconds typical

Ambient Temperature Range and Temperature Stability

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

Power

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

LIFETIME WARRANTY

Free Factory Input & Output Calibration!

Description and Features

The **API 1200 G** and **API 1220 G** are factory configured for a thermocouple input and can be ranged for virtually all thermocouple types and related temperature spans. Standard features include automatic cold junction compensation and upscale T/C burnout protection. Heavy-duty relay contacts allow the module to directly control high capacity loads.

API exclusive features include a ***LoopTracker*** LED that varies in intensity with changes in the process signal, alarm status LEDs for each alarm, and a **Functional Test Pushbutton** to toggle the relays independent of the input.

The **API 1200 G** provides a single setpoint adjustment and DPDT relay contacts. The alarm output can be factory configured for HI or LO operation, non-latching or latching, normal (fail-safe) or reverse (non-fail-safe) acting.

The **API 1220 G** contains two independent setpoints with two SPDT relay contact outputs. The alarm output can be factory configured for HI/HI, HI/LO, LO/HI or LO/LO operation, normal acting (fail-safe) or reverse acting (non-fail-safe).

Models & Options

Factory Configured—Please specify thermocouple type, temperature range in °F or °C, and options

API 1200 G	Thermocouple input alarm trip, 1 DPDT relay, HI alarm, normal action (failsafe), non-latching, 115 VAC
API 1220 G	Thermocouple input dual alarm trip, 2 SPDT relays, HI/LO, normal action (failsafe), non-latching, 115 VAC

Options—Add to end of model number

A230	Powered by 230 VAC, 50/60 Hz
D	Powered by 9-30 VDC
B	Downscale T/C protection instead of upscale
R	Reverse-acting alarms (non-failsafe)
L	Low trip (on decreasing signal) for 1200 G
HT	Latching alarm with pushbutton reset, API 1200 G only
HP	Latching alarm with power-off reset, API 1200 G only
A	Adjustable deadbands for 1220 G
HH	High/High trip for 1220 G instead of High/Low
LL	Low/Low trip for 1220 G instead of High/Low
U	Conformal coating for moisture resistance

Accessories—Order as a separate line item

API 011	11-pin socket
API 011 FS	11-pin finger safe socket
API TK36	DIN rail, 35 mm W x 39" L, aluminum

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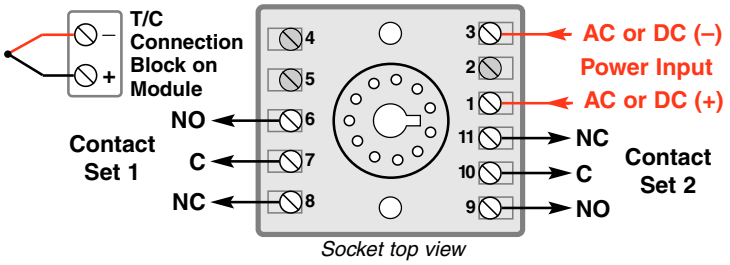
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ELECTRICAL CONNECTIONS

WARNING! All wiring must be performed by qualified personnel only. This module requires an industry-standard 11-pin socket. Order API 011 or finger-safe API 011 FS socket separately.

Power Input Terminals – The white label on the side of the API module will indicate the power requirements. AC power is connected to terminals 1 and 3. For DC powered modules, polarity **MUST** be observed. Positive (+) is wired to terminal 1 and negative (–) is wired to terminal 3.

Thermocouple Input – The connection block is located on the side of the module. Polarity must be observed. With thermocouples, the red wire is connected to the negative (–) terminal.



Socket top view

Relay Output Terminals – Terminals 6, 7, 8 and 9, 10, 11 provide the appropriate connections for the desired relay operations. (NO = Normally Open, NC = Normally Closed, C = Common). NOTE: Although the API 1200 G has a pair of relays, these relays will energize and de-energize in unison. The API 1220 G relays operate independently.

SETUP

The thermocouple type, temperature range and alarm types are pre-configured at the factory as specified on your order. No input calibration is necessary. Contact factory for custom ranges or modifications.

Setpoint Control – This multi-turn potentiometer (one for each setpoint on the API 1220 G) 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.

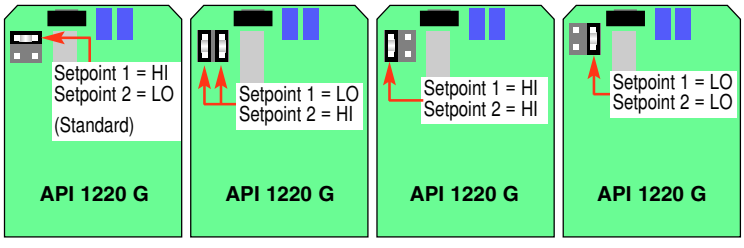
Deadband Control – The API 1200 G deadband potentiometer allows the alarm trip and reset window to be adjusted symmetrically about the setpoint from 1 to 100% of the span.

The deadband is fixed at 1% of span on the API 1220 G. The API 1220 GA with adjustable deadband option allows deadbands to be adjusted symmetrically about each setpoint from 1 to 100% of the span.

Adjustable deadband allows the operator to fine tune the point at which the alarm trips (alarm condition) and resets (non alarm condition). The deadband is typically used to prevent chattering of the relays or false trips when the process signal is unstable or changes rapidly.

API 1220 G Alarm Configuration – The alarm configuration of the API 1220 G is pre-configured at the factory per your order, but if a change is necessary, internal jumpers can be used to modify the alarm type as follows.

1. Unplug the module from the socket.
2. Remove the 4 screws from the module bottom and remove the plastic case.
3. Unplug the circuit board with the test button from the base.
4. Note location of jumper block at top left of circuit board next to test button.
5. Place jumpers as indicated for desired alarm operation. The standard HI/LO setting is with one jumper across the two top pins or with no jumper at all. Never place a jumper across the two bottom pins!
6. Replace board, cover, and screws.



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

TEST BUTTON

The functional test pushbutton toggles the alarm status independent of the input when depressed. It verifies the alarm and system operation and also provides the additional function of unlatching the alarm on the API 1200 GHT with the latching alarm option.

OPERATION

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 to provide a quick visual picture of your process loop at all times. 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. This features greatly aid in saving time during initial start-up or troubleshooting.

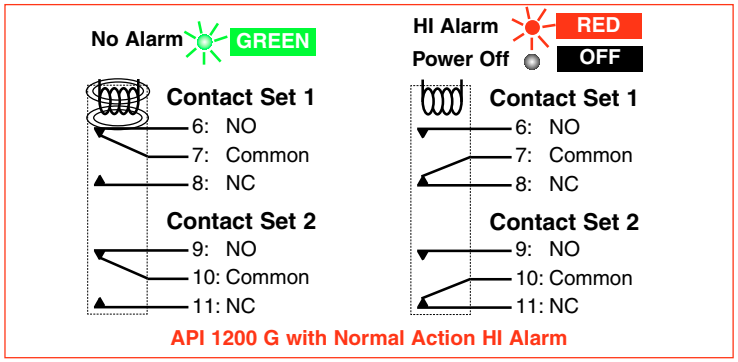
The bi-color alarm LED provides a visual indication of the alarm status. In all configurations, a GREEN LED indicates a non-alarm condition and a RED LED indicates an alarm condition.

Alarm Relays – In the normal mode of operation (failsafe), 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.

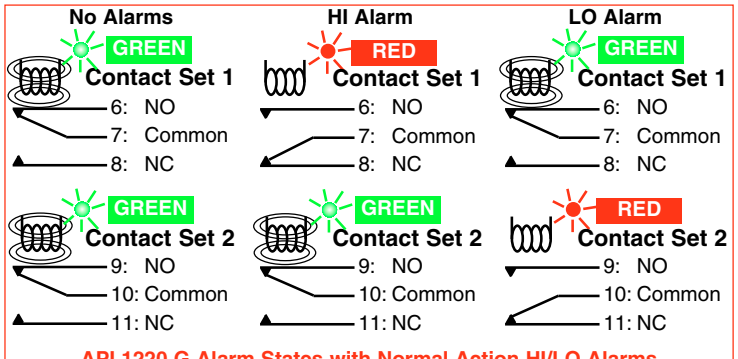
If reverse acting mode is selected (non-failsafe), the relay coil is de-energized in a non-alarm condition and energized in an alarm condition. The alarm will activate when the input signal exceeds the setpoint (HI alarm) or falls below the setpoint (LO alarm), then will automatically reset when the alarm condition no longer exists.

API 1200 GHT Latching Alarm – For units with the **HT** latching alarm option, the Test Switch is also used to reset the alarm relays. The alarm relay contacts will remain in the alarmed condition until the input signal falls below the high alarm setpoint (or above low alarm setpoint, depending on configuration) and the Test/Reset pushbutton has been pressed or power to the unit has been switched off.

API 1200 GHP Latching Alarm – For units with the **HP** latching alarm option, the alarm relay contacts will remain in the alarmed condition until the input signal falls below the high alarm setpoint (or above low alarm setpoint, depending on configuration) and the power to the unit has been switched off.



API 1200 G with Normal Action HI Alarm



API 1220 G Alarm States with Normal Action HI/LO Alarms

Common Thermocouple Specifications

Type	Polarity & Material	Wire ID Properties	Pol./Wire Colors	Practical Temp Range	Outer Insulation	Limits of Error
J	+ Iron	Very magnetic	+ White	32 to 1336°F	Black (Ext. grade)	±4°F or ±0.8% of rdg
	– Constantan		– Red	0 to 724°C	Brown (T/C grade)	±2°F or ±0.4% of rdg
K	+ Chromel		+ Yellow	32 to 2282°F	Yellow (Ext. grade)	±4°F or ±0.8% of rdg
	– Alumel	Slightly magnetic	– Red	0 to 1250°C	Brown (T/C grade)	±2°F or ±0.4% of rdg
N	+ NICROSIL	Greater stiffness	+ Orange	32 to 2282°F	Orange (Ext. grade)	±4°F or ±0.8% of rdg
	– NISIL		– Red	0 to 1250°C	Brown (T/C grade)	±2°F or ±0.4% of rdg
T	+ Copper	Copper color	+ Blue	–299 to 700°F	Blue (Ext. grade)	±1.5°F or ±0.8% rdg, ±1% rdg <32°F
	– Constantan		– Red	–184 to 371°C	Brown (T/C grade)	±0.9°F or ±0.4% rdg, ±0.8% rdg <32°F
E	+ Chromel	Greater stiffness	+ Purple	32 to 1652°F	Purple (Ext. grade)	±3°F or ±0.5% of rdg
	– Constantan		– Red	0 to 900°C	Brown (T/C grade)	±1.8°F or ±0.4% of rdg
R	+ Pt 13%Rh	Greater stiffness	+ Black	32 to 2700°F	Green (Ext. grade)	±5°F or ±0.5% of rdg
	– Platinum		– Red	0 to 1482°C	Green (T/C grade)	±2.5°F or ±0.25% of rdg
S	+ Pt 10%Rh	Greater stiffness	+ Black	32 to 2700°F	Green (Ext. grade)	±5°F or ±0.5% of rdg
	– Platinum		– Red	0 to 1482°C	Green (T/C grade)	±2.5°F or ±0.25% of rdg

Extend thermocouples up to 2000 feet or 100 Ohms maximum resistance.
Extension wire type must be the same type as the thermocouple type.

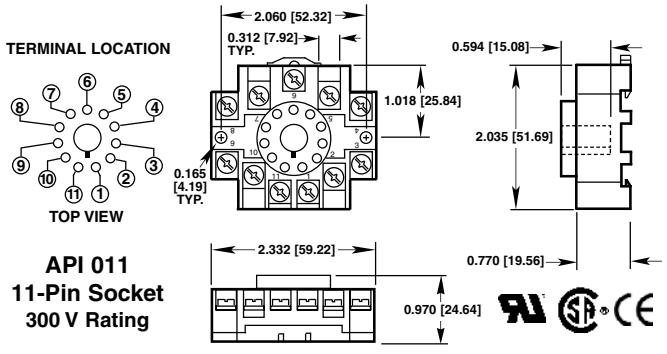
Atmosphere for exposed junction

Type **J**	Reducing
Type **K** or **N**	Clean oxidizing
Type **T**	Mildly oxidizing and reducing or with moisture
Type **E**	Vacuum, inert mildly oxidizing or reducing
Type **R** or **S**	Resists oxidation and corrosion, but contaminated by hydrogen, carbon, and metal vapors

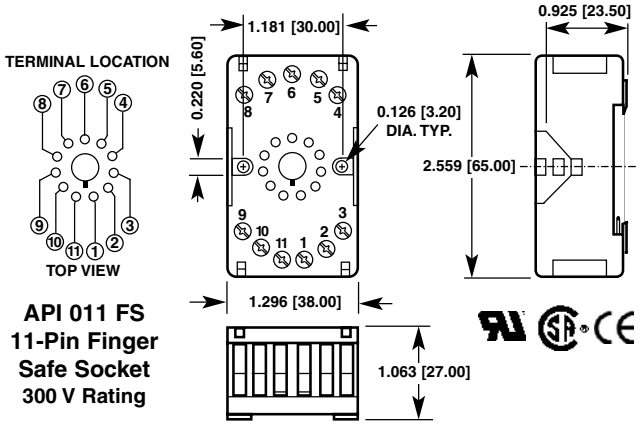
TEMPERATURE CONVERSION

°F = (°C x 9/5) + 32 °C = (°F – 32) x 5/9

API 011 and API 011 FS Sockets



API 011
11-Pin Socket
300 V Rating



API 011 FS
11-Pin Finger Safe Socket
300 V Rating



FREE APPLICATION ASSISTANCE
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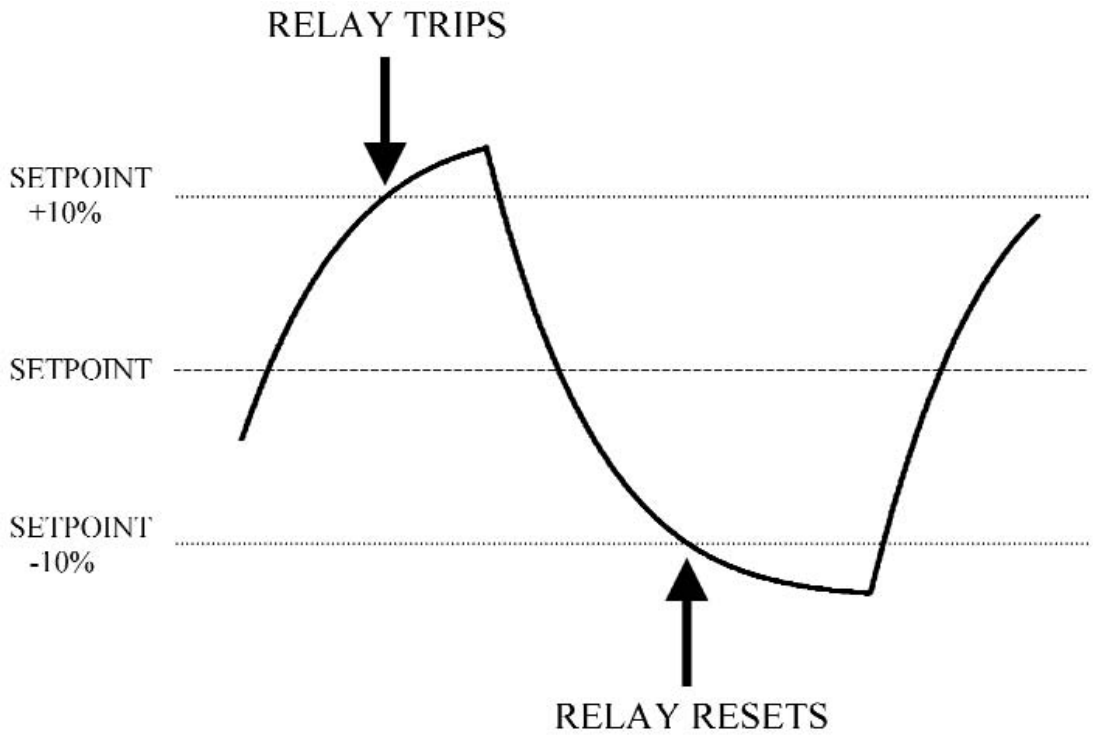
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Frequently Asked Questions

What is Deadband?

DEFINITION
Deadband is the range through which an input can be varied without initiating an observable response. Deadband is usually expressed in percent of span.

EXAMPLE
A 20% total deadband is applied to the setpoint of a monitored parameter. The relay will trip and reset to its untripped state as indicated in the following graph.



20% TOTAL DEADBAND

Can the API 1200 G provide a setpoint of 7°C and a reset point of 6°C with an overall temperature span of 0-10°C?

No. The minimum span we can operate in is a temperature difference equivalent to 5 mV of output change from the thermocouple.

For example, a type J will produce 0.000 millivolts thermoelectric voltage at 0°C and 5.268 millivolts at 100°C. Therefore, the minimum temperature span is about 100°C. For the set point at 7°C and reset point at 6°C, the thermocouple itself has enough of a variance (usually 5%) to it that its output will not be exactly the same. Therefore, we can not guarantee the repeatability of the system to trip at 7°C each time.

What is cold junction compensation and why is it necessary?

Cold junction compensation is required for accurate temperature measurement when using a thermocouple. A thermocouple junction, created whenever two dissimilar metals are connected together (such as Iron and Copper-Nickel), produces a potential difference that varies with temperature. Thermocouples generate a millivolt signal that increases in proportion to the difference in temperature between the hot and the cold junctions.

Thermocouple tables are based on a standard 0°C cold junction temperature. Instruments designed to read thermocouples have a temperature sensor at the instrument connection point designed to electronically correct the reading to the 0°C standard. A millivolt meter can't be used to accurately read a thermocouple directly since it has no 0°C compensation and any additional connections with dissimilar metals creates new thermocouple junctions adding to the error.



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