



Inputs: Two 100 Ω 0.00385 RTDs
Output: 0-1 V to ±10 VDC or 0-1 mA to 4-20 mA **Non-Isolated**

- RTD Leadwire Compensation
- RTD Linearization
- Voltage or Current Output
- Input and Output LoopTracker® LEDs
- Functional Test Pushbutton

Applications

- Monitor Heat Exchanger ΔT
- Convert and Transmit Δ RTD Signals
- Rescale Δ RTD Temperature to Full 4-20 mA

Specifications

RTD Inputs

Two RTDs, 1 hot and 1 cold
 100 Ω Platinum, 0.00385 DIN curve
 3-wire preferred, 2-wire acceptable for short lead length applications

Input Differential Span

Minimum: 20°F or 10°C
 Maximum: 900°F or 500°C

Input Common Mode Temperature

Entire useable range of Pt 100; -325 to 1300°F (-200 to 700°C)

Leadwire Resistance

40 Ω maximum

Leadwire Effect

Less than ±0.02% of span per Ω of leadwire resistance

LoopTracker

Variable brightness LEDs indicate input/output loop level and status

Output Range

*Factory Configured—Please specify output range
 Consult factory for special ranges*

	Minimum	Maximum	Load Factor
Voltage:	0-1 VDC	0-10 VDC	
Bipolar Voltage:	±1 VDC	±10 VDC	
Current (20 V compliance):	0-1 mA DC	0-20 mA DC	1000 Ω at 20 mA

Outputs clamped not to exceed ±5% over- or under-range

Common Output Ranges	Voltage	Current
	0 to 1 V	0 to 20 mA
	0 to 5 V	4 to 20 mA
	1 to 5 V	
	0 to 10 V	
	±5 V	
	±10 V	

Output Zero and Span

Multiturn potentiometers to compensate for load and lead variations
 ±15% of span adjustment range typical

Functional Test Button

Sets output to test level when pressed. Adjustable 0-100% of span
 Test level potentiometer factory set to approximately 50% of span

Response Time

100 milliseconds typical

Output Ripple and Noise

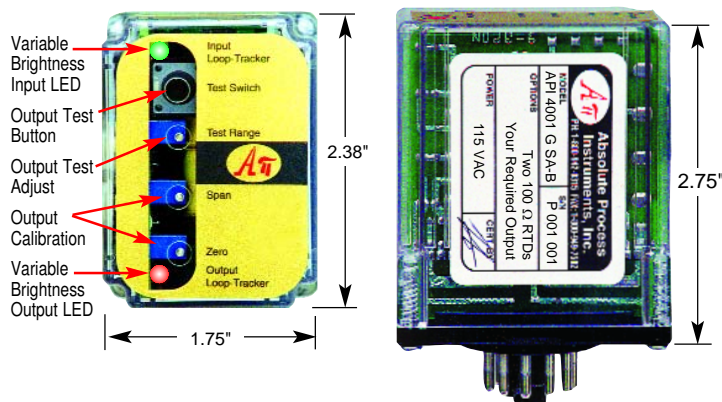
Less than 10 mV_{RMS}

Ambient Temperature Range and Stability

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

Power

Standard: 115 VAC ±10%, 50/60 Hz, 2.5 W max.
P option: 80-265 VAC or 48-300 VDC, 50/60 Hz, 2.5 W typical
A230 option: 230 VAC ±10%, 50/60 Hz, 2.5 W max.
D option: 9-30 VDC, 2.5 W typical



Description and Features

The **API 4001 G SA-B** accepts two DIN curve 100 Ω platinum RTD inputs and provides a linear DC voltage or current output proportional to the difference in temperature of the two RTDs. Differential or single-ended input ranges from 20°F through 900°F (10°C through 500°C) can be accommodated.

The **API 4001 G SA-B** is factory configured to a specific RTD temperature span (°C or °F), and corresponding DC voltage or current output. 3-wire RTD leadwire compensation and linearization for accurate output over a wide temperature range is standard.

Eight common DC output ranges are standard. Consult factory for other outputs. The module power supply is isolated from the input and the output.

API exclusive features include two **LoopTracker** LEDs and a **Functional Test Pushbutton**. The LoopTracker LEDs (Green for input, Red for output) vary in intensity with changes in the process input and output signals. Monitoring the state of these LEDs can provide a quick visual picture of your process loop at all times.

The functional test pushbutton provides a fixed output (independent of the input) when held depressed. The test output level can be field-adjusted via a multiturn potentiometer. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting.

The **4001 G SA-B** plugs into an industry standard 11-pin socket sold separately. Sockets **API 011** and finger-safe **API 011 FS** allow either DIN rail or panel mounting.

Models & Options

Factory Configured—Please specify output range and options

API 4001 G SA-B Dual RTD input differential transmitter, 115 VAC

Options—Add to end of model number

P	Powered by 80-265 VAC or 48-300 VDC, 50/60 Hz
A230	Powered by 230 VAC, 50/60 Hz
D	Powered by 9-30 VDC
U	Conformal coating for moisture resistance

Accessories—Order as 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



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.

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.

RTD Input – The connections are made to the 11-pin socket. You may wish to check the RTD sensors with an ohmmeter before connecting since RTD wire color-coding varies.

For the **Low** temperature input, the red (or black) wire is connected to terminal 4 and the other two wires with the same color are connected to terminals 5 and 6. When using a 2-wire RTD install a jumper from terminal 5 to terminal 6.

For the **High** temperature input, the red (or black) wire is connected to terminal 8 and the other two wires with the same color are connected to terminals 6 and 7. When using a 2-wire RTD install a jumper from terminal 6 to terminal 7.

Signal Output Terminals – Polarity must be observed when connecting the signal output to the load. The positive connection (+) is connected to terminal 9 and the negative (-) is connected to terminal 10. Note that with current outputs the module provides power to the output loop.

CALIBRATION

The API 4001 G SA-B is factory calibrated to your input/output specifications.

1. Recalibration of the API 4001 G SA-B will require two accurate, matched RTD simulators, plus an accurate DC digital voltmeter, for best results.
2. Be aware that measuring small temperature differentials (20°F to 40°F or 10°C to 20°C) on large offsets such as 800°F (400°C) or more will require very precise matching ($\pm 0.1\%$) of RTDs for acceptable results.
3. To calibrate, connect two RTD simulators to the module input, and an accurate DC voltmeter (or milliammeter, as required) to the module output.
4. For best accuracy, calibrate the unit near the actual ambient temperatures the unit will encounter in the application.
5. Set the cold RTD simulator to the low-end differential temperature compared to the hot RTD simulator.
6. Adjust the module's zero control for the specified 0% (low end) output.
7. Set the hot RTD simulator to the high differential value.
8. Adjust the module span control for the specified high (100%) output level.

The zero and span controls normally have little interaction, but adjustments may be repeated for maximum accuracy.

Finally, the Test Cal control may be set to provide the desired output when the Test Pushbutton is held depressed.

TEST BUTTON

The Test pushbutton may be set to provide the desired output when depressed. This will drive the device on the output side of the loop (a panel meter, chart recorder, etc.) with a known good signal that can be used as a system diagnostic aid during initial start-up or during troubleshooting. It can be adjusted to vary the output signal from 0 to 100% of the calibrated output range. When released, the output will return to normal.

Turn the multi-turn Test Range potentiometer while holding the Test Switch depressed until the desired output test level is reached.

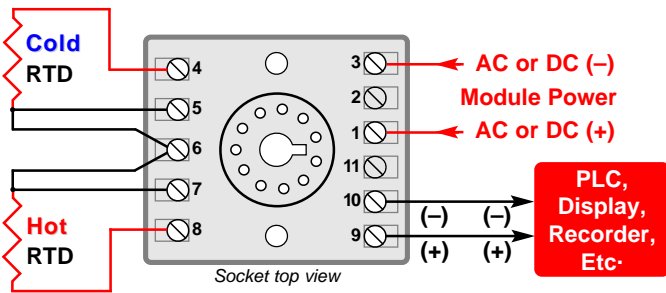
Example: If you are isolating a 4-20 mA current loop, when the pushbutton is held depressed, the output from the module will be a constant signal between 4 and 20 mA depending on the setting of the Test Range adjustment pot.

OPERATION

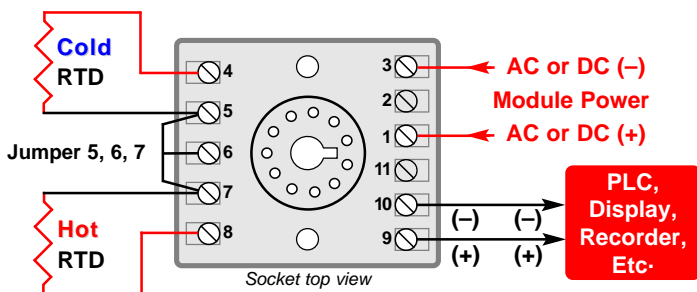
The API 4001 G SA-B excites the "hot" and "cold" RTDs with constant 5 mA current sources which are linearized for 100 Ω platinum, DIN-curve RTDs. A switched-capacitor technique is used to convert the temperature differential signal into a single-ended signal. A precision amplifier then amplifies this signal. Non-interactive zero and span controls provide a standard level signal to the output stage. The output stage is internally configured for voltage or current output and the gain is scaled to the specific user-requested limits.

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, this may indicate a problem with 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 red 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.



API 4001 G SA-B typical wiring



API 4001 G SA-B typical wiring with 2-wire RTDs
Use only for short lead lengths!

Temperature

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