



**API 4400 G thru  
API 4408 G**

**Isolated**

**DC to DC Math Modules  
Add, Subtract, Average**

**Input:** 0-100 mV to 0-10 VDC or 0-1 mA to 0-20 mA

**Output:** 0-1 V to  $\pm 10$  VDC or 0-1 mA to 4-20 mA

- Add, Subtract, or Average up to 4 DC Inputs
- Input and Output LoopTracker® LEDs
- Functional Test Pushbutton
- 2000 VRMS Input/Output/Power Isolation
- Wide Bandwidth Option

## Applications

- Add, Subtract, Average Flow Signals
- Calculate Average Temperatures

## Specifications

### Input Range

Factory Configured—Please specify input range

|          | Minimum    | Maximum                     |
|----------|------------|-----------------------------|
| Voltage: | 0-100 mVDC | 0-10 VDC to $\pm 10$ VDC    |
| Current: | 0-1 mADC   | 0-20 mADC including 4-20 mA |

Popular ranges: 0-1 VDC, 0-5 VDC, 1-5 VDC, 0-10 VDC,  
 $\pm 5$  VDC,  $\pm 10$  VDC, 0-20 mA, 4-20 mA

System voltages must not exceed socket voltage rating  
Consult factory for special ranges or functions

### Input Impedance

Voltage: 100 k $\Omega$  per volt nominal Current: 50  $\Omega$  nominal

### Input Voltage Burden (Current)

1.0 V<sub>RMS</sub> maximum

### Balance Between Inputs

Better than  $\pm 0.5\%$  of span

### LoopTracker®

Variable brightness LEDs indicate input/output loop level and status

### Output Range

Factory Configured—Please specify output range

|                              | Minimum  | Maximum      |
|------------------------------|----------|--------------|
| Voltage ( $\pm 10$ mA max.): | 0-1 VDC  | $\pm 10$ VDC |
| Current (20 V compliance):   | 0-1 mADC | 0-20 mADC    |

Consult factory for special ranges

### Output Zero and Span

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

### Functional Test Button

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

### Response Time

100 milliseconds typical

Optional 1 millisecond with DF option or consult factory

### Output Linearity

Better than  $\pm 0.1\%$  of span

### Output Ripple and Noise

Less than 10 mV<sub>RMS</sub>

### Isolation

2000 V<sub>RMS</sub> minimum

Full isolation: power to input, power to output, input to output

### Ambient Temperature Range

$-10^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  operating

### Temperature Stability

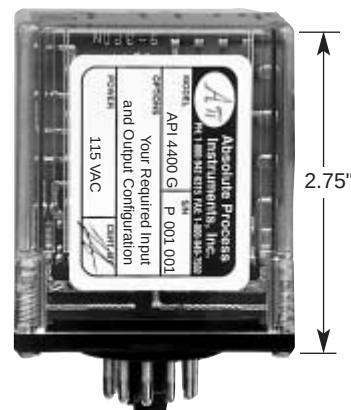
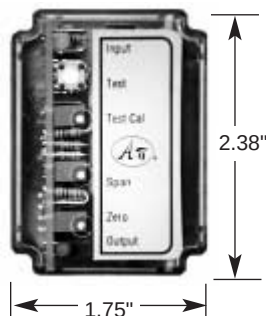
Better than  $\pm 0.02\%$  of span per  $^{\circ}\text{C}$

### Power

Standard: 115 VAC  $\pm 10\%$ , 50/60 Hz, 2.5 W max.

A230 option: 230 VAC  $\pm 10\%$ , 50/60 Hz, 2.5 W max.

D option: 9-30 VDC, 2.5 W typical



**Free Factory  
Input & Output  
Calibration!**

## Models and Options

API 4400 G (A + B + C + D) / 4

API 4401 G (A + B + C) / 3

API 4402 G (A + B) / 2

API 4403 G (A + B + C - D) / 3

API 4404 G (A + B - C - D) / 2

API 4405 G A - B - C - D

API 4406 G (A + B - C) / 2

API 4407 G A - B - C

API 4408 G A - B

**Standard Power**  
115 VAC, 50/60 Hz

Options—Specify on Order

A230 230 VAC, 50/60 Hz

D 9-30 VDC

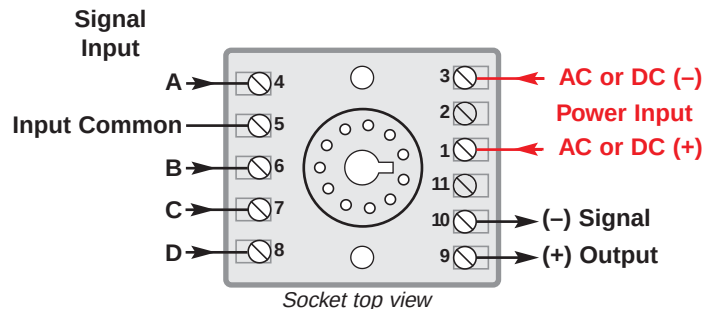
DF Fast response time, 1 millisecond

U Conformal coating for moisture resistance

Accessories—See other side

## Electrical Connections

Order API 011 or API 011 FS socket separately



**ABSOLUTE PROCESS INSTRUMENTS, Inc.**  
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# API 4400 G thru API 4408 G DC-DC Math Modules

## FUNCTIONAL DESCRIPTION

The API 4400 G through 4408 G accept up to four DC voltage or current inputs and provide an optically isolated DC voltage or current output that is proportional to the sum and/or difference of the inputs depending on the model.

The nine different models can accept a variety of additive and subtractive input combinations. In addition, non-standard inputs and outputs are available from 100 mV to 100 VDC. A wide bandwidth 1 millisecond response model is available for high speed applications.

Generally the A, B, C, and D inputs should be the same type, but mixing the ranges of the various inputs is possible. Consult the factory when selecting the API 4400 G series for your application.

The API 4400 G series uses no transformers or choppers in the signal path for best noise immunity and freedom from AC artifacts in the output. In addition, the module features full 3-way (input, output, power supply) isolation.

Note that the inputs are not isolated from each other and use the same signal common connection as indicated in the Electrical Connections diagram.

## UNIQUE FEATURES

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. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting.

When held depressed, the functional test pushbutton will provide a fixed output, independent of the input, factory set to approximately 50% of the calibrated output range. This test output level can be set by a top-accessible multiturn potentiometer.

The API 4400 G series 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.

## OPERATION

The API 4400 G series input can be configured to allow up to four inputs to be scaled and connected to either additive or subtractive amplifier inputs according to the model designation.

The input signal is filtered and cancels any offset of the input relative to the output. 50  $\Omega$  shunts are used at the input for current-to-voltage conversion if required.

The resulting DC signal is passed through an optical coupler which carries the signal across an isolation barrier. The output stage is then configured to select the particular output range (voltage or current) as required.

The 4400 G series also includes a power supply which provides dual regulated and isolated supplies for circuit operation.

## CALIBRATION

Calibration requires accurate signal generation and measurement equipment. Calibration should not be attempted unless such equipment is available.

Standard calibration for all models is such that 100% of the output level will occur when all additive inputs are at 100% and all subtractive inputs are at 0%.

0% output will occur when when all inputs (additive or subtractive) are at 0%. Any other calibration is non-standard.

Note that 0% and 100% refer to percent of span and not the absolute level. For example, in a 4-20 mA loop, 4 mA is considered 0% and 20 mA is considered 100%.

## RELATED PRODUCTS

The following products are available for use with a DC voltage or current input in applications where input signal isolation is required. Refer to the appropriate data sheets for details.

### API 4380 G

DC to DC isolating transmitters. Field selectable inputs and outputs.

### API 4380 DIN

Same as API 4380 G but DIN style case and universal power 48-300 VDC or 80-265 VAC.

### API 4380 DD

Same as API 4380 DIN, but 9-30 VDC power.

### API 4300 G

Factory ranged DC to DC isolating transmitter. For applications requiring special options and/or ranges.

### API 7500 G

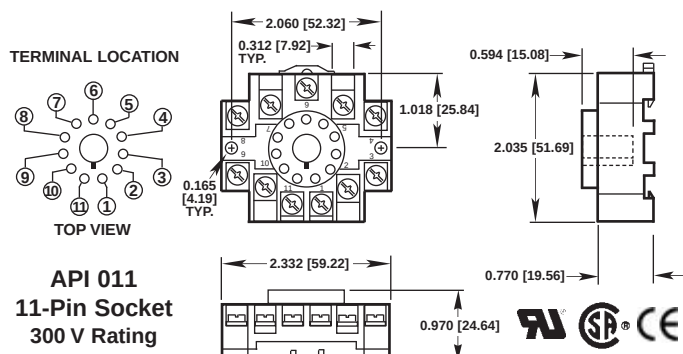
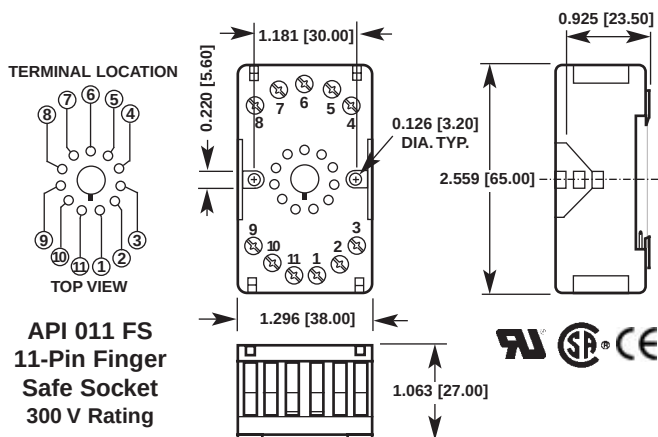
Field selectable DC to frequency isolating transmitter.

## ACCESSORIES

API 011 11-pin socket

API 011 FS 11-pin finger-safe socket

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



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

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