

**Input:** 0-100 mV to 0-10 VDC or 0-1 mA to 0-20 mA  
**Output:** 0-1 V to ±10 VDC or 0-1 mA to 4-20 mA

- Add, Subtract, or Average up to 4 DC Inputs
- Factory Set Custom I/O Ranges
- Easy-to-Install Plug-In Design
- Full 2000 V Input/Output/Power Isolation
- Input and Output LoopTracker® LEDs
- Output Test Button

**Applications**

- Add, Subtract, Average Flow Signals
- Average Multiple Signals

**DC Input Ranges**

Factory configured, please specify each input range

	Minimum	Maximum
Voltage:	0-100 mVDC	0-10 VDC
Bipolar voltage:	±100 mVDC	±10 VDC
Current:	0-1 mADC	0-20 mADC, 4-20 mA
Popular ranges:	0-1 VDC, 0-5 VDC, 1-5 VDC, 0-10 VDC, ±5 VDC, ±10 VDC, 0-20 mA, 4-20 mA	

System voltages must not exceed socket voltage rating. Inputs are converted to a percentage and then the math function is applied. Consult factory for mixed ranges, special ranges or non-standard functions.

**Input Impedance**

Voltage: 100 kΩ per volt nominal  
 Current: 50 Ω nominal

**Input Voltage Burden (Current)**

1.0 VRMS maximum

**Balance Between Inputs**

Better than ±0.5% of span

**LoopTracker**

Variable brightness LEDs indicate I/O loop level and status

**DC Output Range**

Factory configured, please specify output range or consult factory. See table on other side for common ranges.

Voltage, 10 mA max.:	0-1 VDC to	0-10 VDC
Bipolar voltage:	±1 VDC to	±10 VDC
Current:	0-1 mADC to	0-20 mADC
	20 V compliance, 1000 Ω at 20 mA	

**Output Calibration**

Multi-turn zero and span potentiometers for output ±15% of span adjustment range typical

**Output Loop Power Supply**

20 VDC nominal, regulated, 25 mADC, max. ripple <10 mVRMS

**Output Test**

Sets output to test level when pressed  
 Adjustable 0-100% of span

**Output Ripple and Noise**

Less than 10 mVRMS

**Linearity**

Better than ±0.1% of span

**Ambient Temperature Range and Stability**

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

**Response Time**

100 milliseconds typical, faster response times are available  
 DF option: 1 millisecond response time

**Isolation**

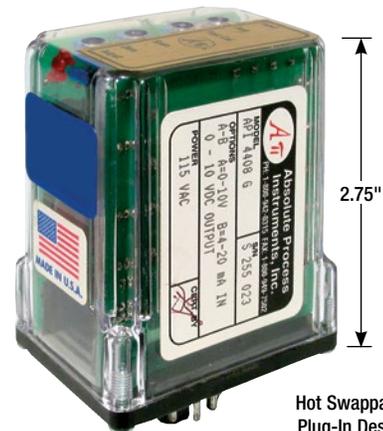
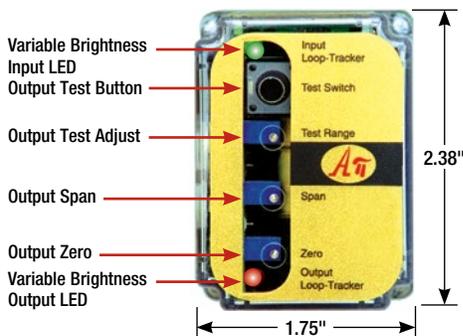
2000 VRMS minimum  
 Full isolation: power to input, power to output, input to output  
 Individual inputs are single-ended (common ground)

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



Hot Swappable Plug-In Design



**Description**

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

The A, B, C, and D inputs should be the same type, and mixed input ranges are allowable. Consult the factory when selecting mixed input ranges.

Inputs are converted to a percentage and then the math function is applied. Consult the factory if true voltage math is required.

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. The inputs are not isolated from each other and use the same signal common connection. The modules do feature full 3-way (input, output, power supply) isolation. A wide bandwidth 1 millisecond response model is available for high-speed applications.

Common ranges as well as custom ranges are possible. Consult the factory for assistance with special ranges.

**LoopTracker**

API exclusive features include two LoopTracker LEDs (green for input, red for output) that vary in intensity with changes in the process input and output signals. These provide a quick visual picture of your process loop at all times and can greatly aid in saving time during initial startup and/or troubleshooting.

**Output Test**

An API exclusive feature includes the Functional Test Button to provide a fixed output (independent of the input) when held depressed. The output test level is adjustable from 0 to 100% of output span.

The functional test button greatly aids in saving time during initial startup and/or troubleshooting.

**Installation**

The API 4400 G through API 4408 G plug into an industry standard 11-pin octal socket sold separately. Sockets API 011 and finger-safe API 011 FS allow either DIN rail or panel mounting. The plug-in design, 3-way isolation, and robust electronics allows the module to be quickly hot-swapped without removing the power or I/O signals.

Model	Function	Factory Configured Input	Output	Power
API 4400 G	(A + B + C + D) / 4	Specify 4 input ranges	Factory configured, specify output range	115 VAC
API 4401 G	(A + B + C) / 3	Specify 3 input ranges		115 VAC
API 4402 G	(A + B) / 2	Specify 2 input ranges		115 VAC
API 4403 G	(A + B + C - D) / 3	Specify 4 input ranges		115 VAC
API 4404 G	(A + B - C - D) / 2	Specify 4 input ranges		115 VAC
API 4405 G	A - B - C - D	Specify 4 input ranges		115 VAC
API 4406 G	(A + B - C) / 2	Specify 3 input ranges		115 VAC
API 4407 G	A - B - C	Specify 3 input ranges		115 VAC
API 4408 G	A - B	Specify 2 input ranges		115 VAC

**Power options—add to end of model number**

A230 230 VAC  
 P 85-265 VAC or 60-300 VDC  
 D 9-30 VDC

**Options—add to end of model number**

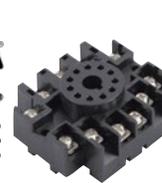
DF Fast response, 1 millisecond nom. response time  
 DF option will cause output noise levels greater than standard specifications.  
 U Conformal coating for moisture resistance

**Accessories—order as separate line item**

API 011 11-pin socket  
 API 011 FS 11-pin finger-safe socket  
 API 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.

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. See [api-usa.com](http://api-usa.com) for latest product information. Consult factory for your specific requirements.

**WARNING:** This product can expose you to chemicals including lead and nickel, which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

## Socket and Mounting

Install module in a protective panel or enclosure. Allow space around module for air flow. Use API 011 or API 011 FS socket. See specifications for maximum allowable socket voltages. The socket clips to a standard 35 mm DIN rail or can be mounted to a flat surface.

## Ranges

See the model/serial number label for module information, module power requirements, options, and I/O range information.

API 4400 G through API 4408 G input and output ranges are factory configured as indicated on the serial number label.

## Signal Inputs

Polarity must be observed when connecting the signal input. Terminals 4, 5, 6, 7, 8 provide the appropriate connections for the input signal. Polarity must be observed when connecting the signal input.

The negative (-) connection for all inputs is connected to terminal 5.

The positive (+) connection for input A is to terminal 4.

The positive (+) connection for input B is to terminal 6.

The positive (+) connection for input C is to terminal 7.

The positive (+) connection for input D is to terminal 8.

## Signal Output

Polarity must be observed for output wiring connections. If the output does not function, check wiring and polarity.

When a current output is ordered, it provides power to the output current loop (sourcing).

Terminals 9 (+) and 10 (-) provide the connections for the output. Note that the output provides power to the output loop.

## Module Power

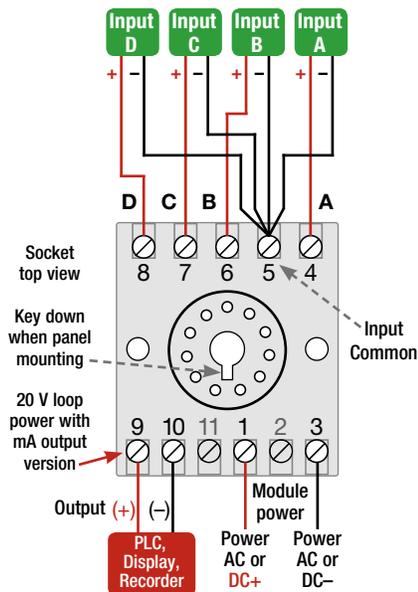
Check model/serial number label for module operating voltage to make sure it matches available power.

AC power is connected to terminals 1 and 3.

For DC powered modules (D option), polarity MUST be observed.

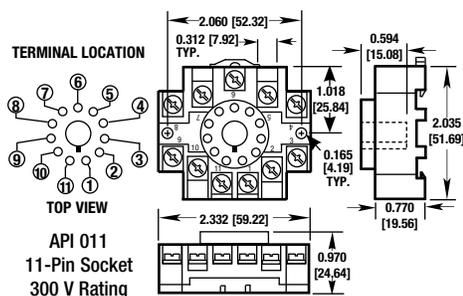
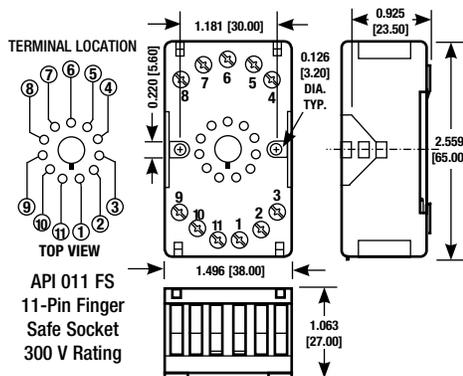
Positive (+) is wired to terminal 1

Negative (-) is wired to terminal 3.



**△ \* Do not make connections to unused terminals!**

**To maintain full isolation avoid combining power supplies in common with input, output, or unit power.**



## Calibration

Input and output ranges as specified on your order are factory pre-configured (at 24°C ±1°C). Top-mounted, Zero and Span potentiometers can be used to calibrate the output to compensate for load and lead variations.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Using an accurate calibration source, provide an input to the module equal to the minimum input required for the application.
3. Using an accurate measurement device for the output, adjust the Zero potentiometer for the exact minimum output desired. The Zero control should only be adjusted when the input signal is at its minimum. This will produce the corresponding minimum output signal. For example: 4 mA for a 4-20 mA output or -10 V for a ±10V output.
4. Next, set the input at maximum, then adjust the Span pot for the exact maximum output desired. The Span control should only be adjusted when the input signal is at its maximum. This will produce the corresponding maximum output signal. Example: for 4-20 mA output, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. Repeat adjustments for maximum accuracy.

## Output Test Function

The test button may be used to drive the device on the output (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.

When depressed it will drive the output with a known good signal. When released, the output will return to normal.

The Test Range potentiometer is factory adjusted to approximately 50% of the output span. It can be field adjusted if required.

Press and hold the Test button and adjust the potentiometer for the desired output level. When released, the output will return to normal.

## Operation

The API 4400 G through API 4408 G are factory configured series to your exact input and output requirements.

Up to four inputs can 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 Ω shunts are used at the input for current-to-voltage conversion if required.

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 process changes, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

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.