

# Strain Gauge (Bridge) to DC Transmitter

API 4058 G



**Input:** 0-5 mV to 0-1200 mVDC, 4-10 V Excitation  
**Output:** 0-1 V to ±10 V or 0-1 mA to 4-20 mA **Non-Isolated**

**Field Selectable**  
**One Minute Setup!**



- Drive up to Four 350 Ω Bridges
- Selectable Excitation Voltage
- Selectable Voltage or Current Outputs
- Easy-to-use External Rotary Switches and Setup Tables
- Input and Output LoopTracker® LEDs

## Applications

- Strain Gauge or Load Cell Weighing Systems
- Strain Gauge Pressure Sensors
- Monitor Tanks, Hoppers, Scales, Etc.

## Specifications

### Input Range

Minimum range: 0 to 5 mV  
 Maximum range: 0 to 1200 mV  
 Minimum sensitivity: 0.5 mV/V  
 Maximum sensitivity: 120 mV/V

Millivolt output range is determined by the sensitivity of the sensor (mV/V) and the excitation voltage applied.

$$\text{mV/V sensitivity} \times \text{excitation voltage} = \text{total mV range}$$

### Input Impedance

1 MΩ typical

### Excitation Voltage

Maximum output: 10 VDC maximum at 115 mA  
 Drive capability: Up to four 350 Ω bridges at 10 VDC  
 Adjustability: Switch-selectable, 0 to 10 VDC in 1 V increments  
 Fine adjustment: ±2.5% via multiturn potentiometer  
 Stability: ±0.01% per °C

### Internal Shunt Calibration Resistor Option

Option **M01**: Toggle switch for internal shunt resistor

### Zero Offset

±100% of span in 15% increments

### LoopTracker

Variable brightness LEDs indicate input/output loop level and status

### Output Ranges

	Minimum	Maximum	Load Factor
Voltage:	0-1 VDC	0-10 VDC	
Bipolar Voltage:	±1 VDC	±10 VDC	
Current (20 V compliance):	0-2 mADC	0-25 mADC	1000 Ω at 20 mA

### Output Linearity

Better than ±0.1% of span

### 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  
 Potentiometer factory set to approximately 50% of span

### Response Time

70 milliseconds typical, faster response times are available

### Common Mode Rejection

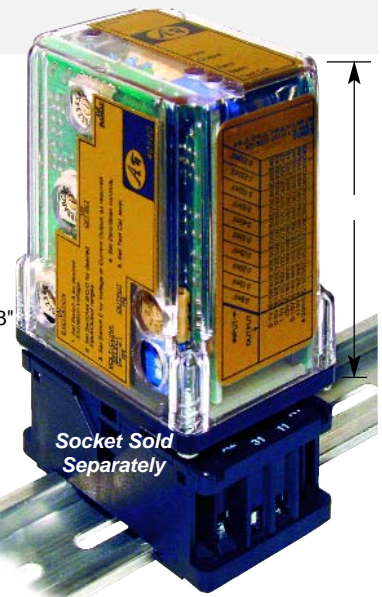
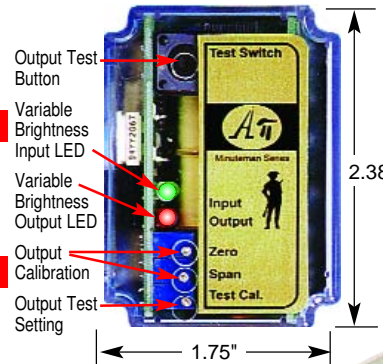
100 dB minimum

### 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, 3.5 W max.  
**P** 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.  
**D12** option: 12 VDC, 3 W typical with 4 load cells  
**D24** option: 24 VDC, 3 W typical with 4 load cells



## Description and Features

The **API 4058 G** accepts a strain gauge, bridge, load cell, or a summed input from up to four sensors, and provides a proportional, non-isolated DC voltage or current output. It includes filtering and processing to allow effective use of low-level transducers in the noisy environments found in industrial applications.

The built-in bridge excitation power supply generates a stable source of excitation voltage to drive from one to four 350 Ω (or greater) bridge type sensors such as load cells, pressure transducers and strain gauges and amplifies and converts the resulting millivolt signal into the selected output.

Input, output, excitation and zero offset are field-configurable, via external rotary and slide switches. Common ranges are on the module label. An offset switch is standard for applications requiring cancellation of sensor offsets or non-zero deadweights (taring).

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 adjusted 0-100% output span. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting.

The **API 4058 G** plugs 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.

## Models & Options

Please specify power and options

**API 4058 G** Field selectable strain gauge to DC transmitter, non-isolated, 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
- D12** Powered by 12 VDC
- D24** Powered by 24 VDC
- M01** Toggle switch with internal shunt calibration resistor
- DF** Fast response, 1 millisecond nominal response time
- 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

Strain/Load Cell



## ELECTRICAL CONNECTIONS

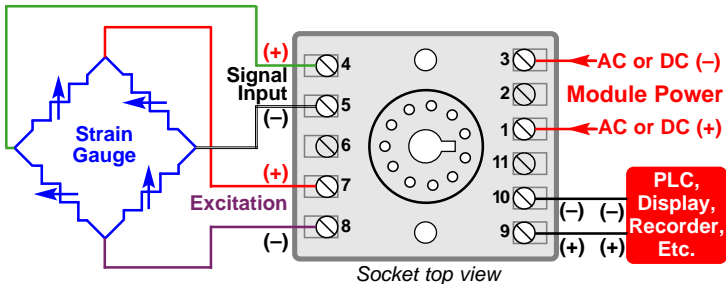
**WARNING!** All wiring must be performed by qualified personnel only. This module requires an industry-standard 11-pin socket. Order API 011 or finger-safe API 011 FS socket.

**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.

**Strain Gauge Input** – Refer to strain gauge manufacturer's data sheet for wire color-coding. Polarity must be observed when connecting the signal input. The positive connection (+) is applied to terminal 4 and the negative (-) is applied to terminal 5.

**Excitation Voltage** – **CAUTION: Never short the excitation leads together. This will cause internal damage to the API 4058 G.** Refer to strain gauge manufacturer's data sheet for wire color-coding. Terminals 7 and 8 provide connections for the DC voltage that is used to excite the strain gauge load cell. Polarity must be observed when connecting the Excitation Output. The positive connection (+) is applied to terminal 7 and the negative (-) is applied to terminal 8.

**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.



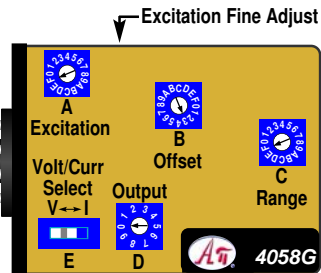
API 4058 G typical wiring.

Refer to strain gauge manufacturer's data sheet for wire color coding.

## RANGE SELECTION

The API 4058 G is configurable to your exact input and output requirements. Ranges are listed on the module labels and at right. See [www.api-usa.com](http://www.api-usa.com) or contact factory for special ranges.

Four rotary switches and a slide switch on the side of the module are used to select input and output ranges.



1. See table and set **Excitation** rotary switch **A** to desired excitation voltage.

Excitation Voltage	10 V	9 V	8 V	7 V	6 V	5 V	4 V	3 V	2 V	1 V	0 V
Switch A	A	9	8	7	6	5	4	3	2	1	0

2. Set **Volt/Curr** switch **E** to voltage (V) or current (I) depending on output type.
3. From the table, find the rotary switch combination that match your input/output ranges and set rotary switches **B**, **C**, and **D**.
4. The Excitation Fine Adjust, Zero, Span and Test Range potentiometers can now be adjusted for the desired output range.

### API 4058 G INPUT RANGES

Rotary Switches	API 4058 G INPUT RANGES											
	0-5 mV	0-10 mV	0-20 mV	0-25 mV	0-30 mV	0-40 mV	0-50 mV	0-100 mV	0-200 mV	0-250 mV	0-1000 mV	
	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	
OUTPUT RANGE Switch E to I	0-1 V	E10	E90	E30	E50	ED0	EB0	E00	E80	E20	E40	E60
	0-2 V	E11	E91	E31	E51	ED1	EB1	E01	E81	E21	E41	E61
	0-5 V	E13	E93	E33	E53	ED3	EB3	E03	E83	E23	E43	E63
	1-5 V	C12	C92	C32	C52	CD2	CB2	C02	C82	C22	C42	C62
	0-10 V	E16	E96	E36	E56	ED6	EB6	E06	E86	E26	E46	E66
	±5 V	E18	E98	E38	E58	ED8	EB8	E08	E88	E28	E48	E68
	±10 V	E19	E99	E39	E59	ED9	EB9	E09	E89	E29	E49	E69
	4-20 mA	C15	C95	C35	C55	CD5	CB5	C05	C85	C25	C45	C65
	0-20 mA	E16	E96	E36	E56	ED6	EB6	E06	E86	E26	E46	E66

## CALIBRATION

Top-mounted, Zero and Span potentiometers can be used should fine-tuning of the output be necessary. An excitation voltage fine adjust potentiometer is located on the side of the module.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Using an accurate voltmeter across terminals 7 and 8, adjust the excitation voltage fine adjust potentiometer for the exact output desired.
3. Provide an input to the module equal to zero or the minimum input required for the application.
4. Using an accurate measurement device for the module 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.
5. Set the input at maximum, and 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.
6. This procedure may have to be repeated several times to achieve the desired accuracy over the selected range. This is a basic calibration procedure and does not account for offsets or tare weights. To achieve optimum results, it is recommended that the API 4058 G be calibrated by an accurate bridge simulator before being placed in service.

## 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.

## OPERATION

Strain gauges and load cells are normally passive devices that are commonly referred to as "bridges" due to the four-resistor Wheatstone bridge configuration used in their design. These sensors require a precise excitation source to produce an output that is directly proportional to the load, pressure, etc. that is applied to the sensor.

The exact output of the sensor (measured in millivolts) is determined by the sensitivity of the sensor (mV/V) and the excitation voltage applied. For example, a load cell rated for 3 mV/V sensitivity and 10 VDC excitation will produce an output of 0 to 30 mV for load variations from 0 to 100%.

$$3 \text{ mV/V sensitivity} \times 10 \text{ VDC excitation} = 30 \text{ mV range}$$

The API 4058 G consists of four rotary switches and one slide switch that must be configured to match the specifications of the input sensor(s) and the output requirements.

The API 4058 G provides the excitation voltage to the sensors and receives the resulting millivolt signal in return. This input signal is filtered and amplified, then offset, if required, and passed to the output stage. Depending on the output configuration selected, a DC voltage or current output is generated.

**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.

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

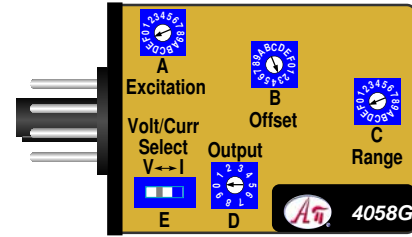


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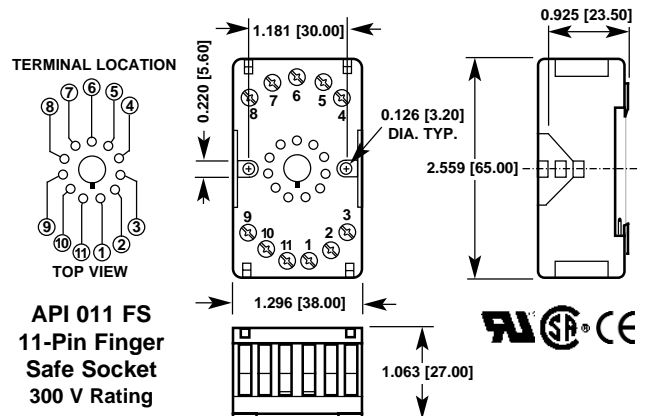
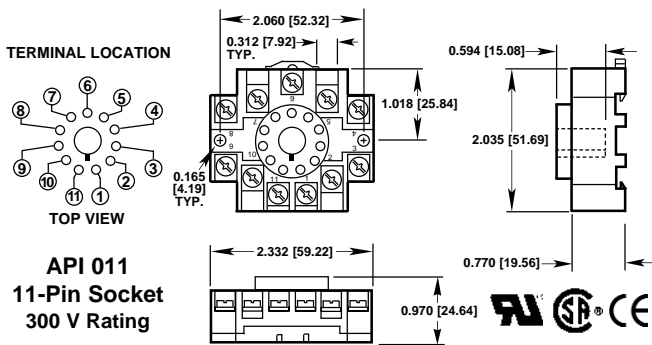
Four rotary switches and a slide switches on the side of the module are used to select input and output ranges.

1. See table and set **Excitation** rotary switch **A** to desired excitation voltage.
2. Set **Volt/Curr** switch **E** to voltage (**V**) or current (**I**) depending on output type.
3. From the table, find the rotary switch combination that match your input/output ranges and set rotary switches **B**, **C**, and **D**.
4. The Excitation Fine Adjust, Zero, Span and Test Range potentiometers can now be adjusted for the desired output range.



		API 4058 G INPUT RANGES																	
Rotary Switches		0-5 mV	±10 mV	0-10 mV	±20 mV	0-20 mV	0-25 mV	±30 mV	0-30 mV	0-40 mV	0-50 mV	0-100 mV	0-200 mV	0-250 mV	0-300 mV	0-400 mV	±500 mV	0-1000 mV	0-1200 mV
		BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
OUTPUT RANGES	Switch E to "V"	0-1 V	E10	E90	E30	E50	ED0	EB0	E00	E80	E20	E40	EC0	EA0	A60	E60	EE0		
	0-2 V	E11	E91	E31	E51	ED1	EB1	E01	E81	E21	E41	EC1	EA1	A61	E61	EE1			
	0-4 V	E12	E92	E32	E52	ED2	EB2	E02	E82	E22	E42	EC2	EA2	A62	E62	EE2			
	0-5 V	E13	A33	E93	AB3	E33	E53	A03	ED3	EB3	E03	E83	E33	E43	EC3	EA3	A63	E63	EE3
	1-5 V	C12	C92	C32	C52	CD2	CB2	C02	C82	C22	C42	CC2	CA2	AE3	C62	CE2			
	0-8 V	E15	E95	E35	E55	ED5	EB5	E05	E85	E25	E45	EC5	EA5	A65	E65	EE5			
	2-10 V	C15	C95	C35	C55	CD5	CB5	C05	C85	C25	C45	CC5	CA5	AE6	C65	CE5			
	0-10 V	E16	A36	E96	AB6	E36	E56	A06	ED6	EB6	E06	E86	E26	E46	EC6	EA6	A66	E66	EE6
	±5 V	E18	A38	E98	AB8	E38	E58	A08	ED8	EB8	E08	E88	E28	E48	EC8	EA8	A68	E68	EE8
	±10 V	E19	A39	E99	AB9	E39	E59	A09	ED9	EB9	E09	E89	E29	E49	EC9	EA9	A69	E69	EE9
Switch E to "I"	0-2 mA	E10	E90	E30	E50	ED0	EB0	E00	E80	E20	E40	EC0	EA0	A60	E60	EE0			
	0-10 mA	E13	E93	E33	E53	ED3	EB3	E03	E83	E23	E43	EC3	EA3	A63	E63	EE3			
	2-10 mA	C12	C92	C32	C52	CD2	CB2	C02	C82	C22	C42	CC2	CA2	AE3	C62	CE2			
	0-16 mA	E15	E95	E35	E55	ED5	EB5	E05	E85	E25	E45	EC5	EA5	A65	E65	EE5			
	4-20 mA	C15	A35	C95	AB5	C35	C55	A05	CD5	CB5	C05	C85	C25	C45	CC5	CA5	AE6	C65	CE5
	0-20 mA	E16	E96	E36	E56	ED6	EB6	E06	E86	E26	E46	EC6	EA6	A66	E66	EE6			

## API 011 and API 011 FS Sockets



Strain/Load Cell



**FREE APPLICATION ASSISTANCE**  
 Call Customer Service  
**800-942-0315**