Strain Gauge/Bridge/Load Cell/Pressure Transducer to DC Transmitters, Field Rangeable — API 4058 G

Input: One to Four 350 Ω Sensors, 0-5 mV to 0-1200 mV, 4-10 VDC Excitation

Output: 0-1 V to ±10 V or 0-1 mA to 4-20 mA, Non-Isolated

- *Drive up to Four 350 Ω Bridges*
- *Adjustable Excitation Power Supply*
- *One Minute Setup for Hundreds of I/O Ranges*
- *Easy-to-use External Switches for Setup*
- *Hot-Swappable Plug-In Design*
- *Input and Output LoopTracker® LEDs*
- *Output Test or Calibration Resistor Options*

Applications

- *Load Cell Weighing Systems and Scales*
- *Strain Gauge Pressure Sensors and Transducers*
- *Tanks, Scales, Extruder Melt Pressure, Crane Loads*

Strain Gauge Input Ranges

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.

mV/V sensitivity X excitation voltage = total mV range

Input Impedance

1 MΩ typical

Common Mode Rejection

100 dB minimum

Calibration Resistor Options

M01 option: Toggle switch with calibration resistor inside module. Specify resistor value.
M02 option: Toggle switch for external (load cell) calibration resistor.

Excitation Voltage

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

LoopTracker

Variable brightness LEDs for input/output loop level and status

DC Output Ranges

Voltage:	0-1 VDC	to	0-10 VDC
Bipolar voltage:	±1 VDC	to	±10 VDC
Current:	0-2 mADC	to	0-25 mADC
	20 V compliance, 1000 Ω at 20 mA		

Output Calibration

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

Zero Offset

±100% of span in 15% increments

Output Test

Sets output to test level when pressed
Adjustable 0-100% of span
Not available with M01 or M02 options

Output Ripple and Noise

Less than 10 mV_{RMS}

Linearity

Better than ±0.1% of span

Ambient Temperature Range and Stability

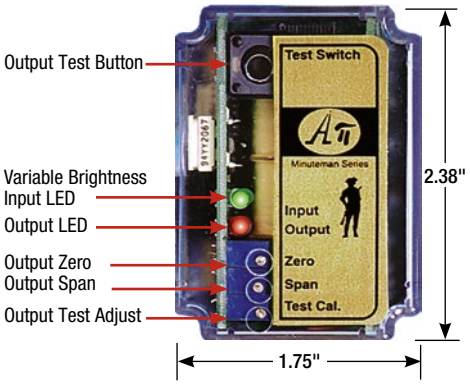
–10°C to +60°C operating ambient
Better than ±0.02% of span per °C stability

Response Time

150 milliseconds typical (6.6 Hz)
DF option: 75 millisecond response time typical (13.3 Hz)
Contact factory for faster response times

Housing and Sockets

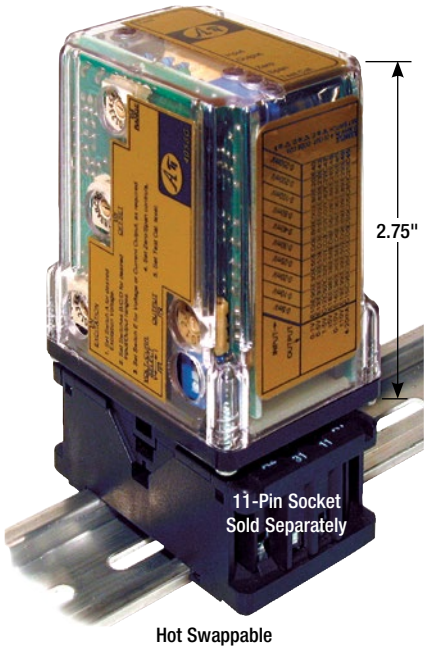
IP 40, requires installation in panel or enclosure
Plugs into API 011 or API 011 FS socket
Socket mounts to 35 mm DIN rail or can be surface mounted



LIFETIME WARRANTY

MADE IN USA

Free Factory I/O Setup!



Hot Swappable
Plug-In Design

1 Minute Setup!

Quick Link
api-usa.com/4058

Power

Standard: 115 VAC ±10%, 50/60 Hz, 2.5 W max.
A230 option: 230 VAC ±10%, 50/60 Hz, 2.5 W max.
P option: 85-265 VAC 50/60 Hz, 60-300 VDC, 2.5 W typ.
D option: 9-30 VDC, 2.5 W typical

Description

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 output is not electrically isolated.

The built-in 115 mA 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 The API 4058 G 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). Zero and span potentiometers allow calibration of the output.

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 test button to provide a fixed output (independent of the input) when held depressed. The output test button greatly aids in saving time during initial startup and/or troubleshooting. The test output level is potentiometer adjustable from 0 to 100% of output span.

The output test is not available with the M01 or M02 options. A calibration resistor switch replaces the test button.

Mounting

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.

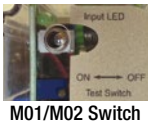
Model	Input	Output	Power
API 4058 G	Field configurable. Specify the following if factory is to set switches Bridge mV/V or mV range Excitation voltage	Field configurable. Specify following if factory is to set switches Output range Output type (V or mA)	115 VAC
API 4058 G A230			230 VAC
API 4058 G P			85-265 VAC or 60-300 VDC
API 4058 G D			9-30 VDC

Options—add to end of model number

M01	Switch with built-in calibration resistor. Specify resistor value.
M02	Switch for external calibration resistor
DF	75 millisecond response time, or consult factory DF option will cause output noise levels greater than standard specifications.
U	Conformal coating for moisture resistance

Accessories—order as a separate line item

API 011	11-pin socket, DIN rail or surface mount
API 011 FS	11-pin finger safe socket, DIN rail or surface mount
API CLP1	Module hold-down spring for high vibration or mobile applications



M01/M02 Switch

API 011 FS
300 V Rating

API 011
300 V Rating

API CLP1

ABSOLUTE PROCESS INSTRUMENTS
1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com

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 for latest product information. Consult factory for your specific requirements.

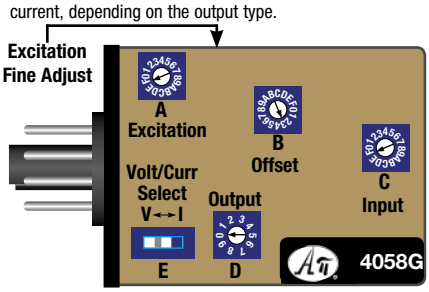
WARNING: This product can expose you to chemicals including lead and nickel, which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Excitation Voltage and Range Selection
It is easier to set the switches before installation. Common ranges are listed on the module label.

1. See table below and set Excitation rotary switch **A** to the desired voltage. The excitation voltage should match the sensor manufacturer's recommendations.

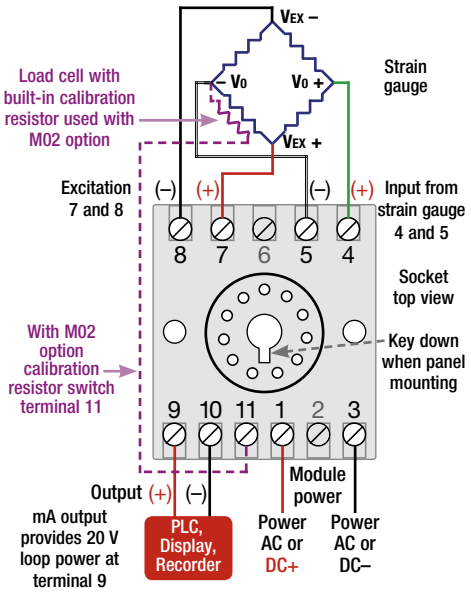
Excitation	10V	9V	8V	7V	6V	5V	4V	3V	2V	1V	0V
Switch A	A	9	8	7	6	5	4	3	2	1	0

2. From the table at right, find the switch combination that matches your input/output range and set rotary switches **B**, **C**, and **D**.
3. Set the Volt/Curr Select slide switch **E** to V for voltage or I for current, depending on the output type.



Socket and Mounting
The module installation requires a protective panel or enclosure. Use API 011 or finger-safe API 011 FS socket. The socket clips to a standard 35 mm DIN rail or can be attached to a flat surface using the two mounting holes.

Input Terminals
Refer to wiring diagram and strain gauge manufacturer's data sheet for wiring and color coding. Polarity must be observed when connecting inputs. Connect up to 4 strain gauges or load cells. Sensor shield wire (if equipped) should be grounded at one end only.



Output	0-1 V	0-2 V	0-4 V	1-5 V	0-5 V	0-8 V	2-10 V	0-10 V	±5 V	±10 V	0-2 mA	2-10 mA	0-10 mA	0-16 mA	4-20 mA	0-20 mA
Switches	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE	BCDE
Input 0-5 mV	E10V	E11V	E12V	C12V	E13V	E15V	C15V	E16V	E18V	E19V	E10I	C12I	E13I	E15I	C15I	E16I
±10 mV					A33V			A36V	A38V	A39V					A35I	
0-10 mV	E90V	E91V	E92V	C92V	E93V	E95V	C95V	E96V	E98V	E99V	E90I	C92I	E93I	E95I	C95I	E96I
±20 mV					AB3V			AB6V	AB8V	AB9V					AB5I	
0-20 mV	E30V	E31V	E32V	C32V	E33V	E35V	C35V	E36V	E38V	E39V	E30I	C32I	E33I	E35I	C35I	E36I
0-25 mV	E50V	E51V	E52V	C52V	E53V	E55V	C55V	E56V	E58V	E59V	E50I	C52I	E53I	E55I	C55I	E56I
±30 mV					A03V			A06V	A08V	A09V					A05I	
0-30 mV	ED0V	ED1V	ED2V	CD2V	ED3V	ED5V	CD5V	ED6V	ED8V	ED9V	ED0I	CD2I	ED3I	ED5I	CD5I	ED6I
0-40 mV	EB0V	EB1V	EB2V	CB2V	EB3V	EB5V	CB5V	EB6V	EB8V	EB9V	EB0I	CB2I	EB3I	EB5I	CB5I	EB6I
0-50 mV	E00V	E01V	E02V	C02V	E03V	E05V	C05V	E06V	E08V	E09V	E00I	C02I	E03I	E05I	C05I	E06I
0-100 mV	E80V	E81V	E82V	C82V	E83V	E85V	C85V	E86V	E88V	E89V	E80I	C82I	E83I	E85I	C85I	E86I
0-200 mV	E20V	E21V	E22V	C22V	E33V	E25V	C25V	E26V	E28V	E29V	E20I	C22I	E23I	E25I	C25I	E26I
0-250 mV	E40V	E41V	E42V	C42V	E43V	E45V	C45V	E46V	E48V	E49V	E40I	C42I	E43I	E45I	C45I	E46I
0-300 mV	EC0V	EC1V	EC2V	CC2V	EC3V	EC5V	CC5V	EC6V	EC8V	EC9V	EC0I	CC2I	EC3I	EC5I	CC5I	EC6I
0-400 mV	EA0V	EA1V	EA2V	CA2V	EA3V	EA5V	CA5V	EA6V	EA8V	EA9V	EA0I	CA2I	EA3I	EA5I	CA5I	EA6I
±500 mV	A60V	A61V	A62V	AE3V	A63V	A65V	AE6V	A66V	A68V	A69V	A60I	AE3I	A63I	A65I	AE6I	A66I
0-1000 mV	E60V	E61V	E62V	C62V	E63V	E65V	C65V	E66V	E68V	E69V	E60I	C62I	E63I	E65I	C65I	E66I
0-1200 mV	EE0V	EE1V	EE2V	CE2V	EE3V	EE5V	CE5V	EE6V	EE8V	EE9V	EE0I	CE2I	EE3I	EE5I	CE5I	EE6I

Excitation Voltage Connection
Polarity must be observed. Never short the excitation leads together. This will cause internal damage to the module.

Signal Output Terminals
Polarity must be observed when connecting the signal output. Current output provides power to the output loop (sourcing).

Module Power Terminals
The module operating voltage shown on the model/serial number label must match available power. AC power can be connected with either polarity. Polarity MUST be observed for DC powered modules.

Calibration
This procedure and does not account for offset or tare weight calibration. To achieve optimum results, it is recommended that the API 4058 G be calibrated using an accurate bridge simulator.

Note: Perform the following calibration procedure any time switch settings are changed.

1. Power 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 to the required voltage.
3. With the input set at zero or the minimum, adjust the front Zero pot for a zero or low-end output (for example, 4 mA for a 4-20 mA output or –10 V with a ±10V output).
4. The zero pot may also be adjusted for a zero reading on the output display instrumentation, e.g. control system or process indicator. Adjusting the zero pot this way eliminates calibration errors in the display instrumentation.
5. Set the input at maximum, and then adjust the Span potentiometer 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. The calibration procedure should be repeated to achieve the desired accuracy over the selected range.

Calibration, Models with Option M01 or M02
The M01 option uses a switch and a calibration resistor inside the API module. Ensure that the correct resistance value was specified.

The M02 option uses a switch for the transducer's internal calibration resistor. The transducer's calibration resistor wires are connected to terminals 5 and 11 on the API 4058 G socket.

The sensor manufacturer should provide the percentage of full-scale transducer output when using the calibration resistor.

Note: Perform the following calibration procedure any time switch settings are changed.

1. Power 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 to the required voltage.
3. With the input set at zero or the minimum, adjust the front Zero pot for a zero or low-end output (for example, 4 mA for a 4-20 mA output or –10 V with a ±10V output).
4. The zero pot may also be adjusted for a zero reading on the output display instrumentation, e.g. control system or process indicator. Adjusting the zero pot this way eliminates calibration errors in the display instrumentation.
5. Set the Test toggle switch to the Test position. The calibration resistor is switched into the circuit to unbalance the bridge.
6. Adjust the span pot for an 80% FS output or 80% reading on the process indicator, or per the manufacturer's percentage of FS output.
7. Return the Test switch to the opposite position and readjust the zero pot if necessary. The calibration procedure should be repeated to achieve the desired accuracy over the selected range.

Using Offset Switch B
Offset switch B allows canceling of sensor offsets such as:

Tare weights or scale deadweight

Compensate for low-output sensors that may have large zero offsets. Switch B can realign the zero control so it has enough range to produce the desired zero output.

Raising the offset to allow calibration of bi-directional sensors.

Lowering the offset to compensate for elevated input ranges.

1. Switch B does not interact with any other switch and is the only switch needed to correct zero offsets. Its only purpose is to adjust or cancel effects of the low end of the input range not corresponding nominally to 0 mV. Setting this switch to "E" results in no offset.
2. To RAISE the output zero, rotate switch B from "E" thru "A", until the Zero control can be set for your application.
3. To LOWER the output zero, rotate switch B from "E" thru "9", until the Zero control can be set for your application.
4. After all switches are set, repeat the calibration procedure.

Output Test Function
Note that models with the M01 or M02 option do not have a Test function and the Test Cal. potentiometer is non-functional.

The output test potentiometer is factory set to provide approximately 50% output. When the test button is depressed it will drive the output with a known good signal that can be used as a diagnostic aid during initial start-up or troubleshooting. When released, the output will return to normal.

The Test Cal. potentiometer can be used to set the test output to the desired level. It is adjustable from 0 to 100% of the output span. Press and hold the Test button and adjust the Test Cal. potentiometer for the desired output level.

Operation
Strain gauges and load cells are commonly referred to as bridges due to their four-resistor Wheatstone bridge configuration. These sensors require a precise excitation source to produce an output that is directly proportional to the load, pressure, etc. 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 mV/V sensitivity X **10** VDC excitation = **30** mV range

The API 4058 G provides a precise 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 level 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.

1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com