Strain Gauge/Bridge/Load Cell/Pressure Transducer to DC Transmitters, Factory Ranged — API 4051 GI

Input: One 350 Ω Sensor, 1 mV to 2000 mV, 4-10 VDC Excitation

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

- *Factory Set for Your Specified Range*
- *Full 3-Way Input/Output/Power Isolation*
- *Internal Excitation Power Supply*
- *DC Voltage or Current Output*
- *Simple Plug-In Design for Faster Installation*
- *Input and Output LoopTracker® LEDs*
- *Output Test Button*
- *Internal Calibration Resistor Option*

Applications

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

Input Range
Factory configured—please specify sensor mV/V and mV range

Minimum sensor range 1 mV
Maximum sensor range: 2000 mV

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 minimum

Excitation Voltage
Factory configured—please specify excitation voltage

Maximum output: 10 VDC maximum at 30 mA
Internal adjustment: 4 to 10 VDC

Stability: ±0.01% per °C
Designed for one 350 Ω (or greater) sensor

LoopTracker
Variable brightness LEDs for input/output loop level and status

Output Ranges
Factory configured—please specify output range

Voltage (10 mA max.):	0-1 VDC	to	0-10 VDC
Bipolar Voltage (±10 mA max.):	±1 VDC	to	±10 VDC
Current:	0-1 mADC	to	0-20 mADC
Compliance, drive at 20 mA:	20 V, 1000 Ω drive		

Output Linearity, Ripple & Noise
Better than ±0.1% of span, <10 mVRMS ripple and noise

Output Zero and Span
Multi-turn 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
Not available with M01 option

Response Time
70 milliseconds (14.2 Hz) typical
Contact factory for other response times
Option DF: 1 millisecond (1000 Hz) response time typical

Common Mode Rejection
100 dB minimum

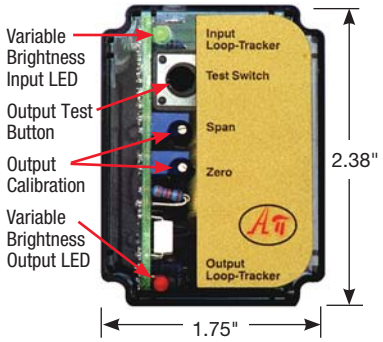
Isolation
1200 VRMS min.
Full isolation: power to input, power to output, input to output

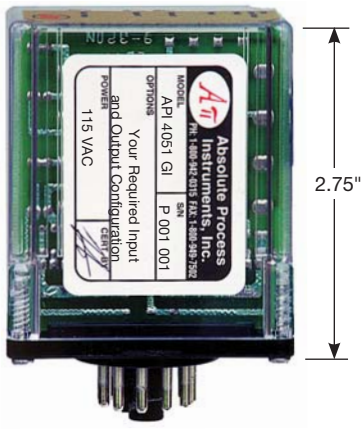
Ambient Temperature Range and Stability
–10°C to +60°C operating ambient
Better than ±0.02% of span per °C stability

Housing and Sockets
IP 40, plugs into 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.
A230 option:	230 VAC ±10%, 50/60 Hz, 2.5 W max.
P option:	60-265 VAC, 50/60 Hz or 85-300 VDC, 2.5 W typical
D option:	9-30 VDC, 2.5 W typical





Plugs Into API 011 or API 011 FS 11 Pin Socket

LIFETIME WARRANTY

Made in USA

Quick Link
api-usa.com/4051

Description
The API 4051 GI accepts a strain gauge, bridge, or load cell input and provides a proportional, isolated DC voltage or current output. It includes filtering and processing to allow effective use of low-level transducers in the noisy environments common in industrial applications.

The built-in bridge excitation power supply generates a stable source of excitation voltage to drive a 350 Ω (or greater) bridge type sensor such as a load cell, pressure transducer, or strain gauge and amplifies and converts the resulting millivolt signal into the factory configured output.

The API 4051 GI requires factory configuration to a specific excitation voltage, millivolt input (mV/V rating of the sensor multiplied by the excitation voltage), DC voltage or DC current output, and power. The input can be configured as zero-based (i.e., 0 to 20 mV), bi-polar (i.e., –30 to +30 mV) for push-pull applications, or offset (i.e., 5 to 33 mV) to electronically compensate for deadweight (tare).

The output can be configured as zero-based, bi-polar, or offset. In addition to the standard output ranges, the API 4051 GI output can be configured meet most non-standard requirements. Contact the factory for assistance.

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 test output level is potentiometer adjustable from 0 to 100% of output span. The output test button greatly aids in saving time during initial startup and/or troubleshooting.

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

Mounting
The API 4051 GI 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.

How to Order

All models are factory ranged. Please specify
Model **API 4051 GI** (operates on 115 VAC)
D for operation on low voltage power
A230 for 230 VAC operation
P for wide ranging power
Bridge mV/V
Excitation voltage
Output range
Options as required
Resistor value if ordering M01 option

Model	Input	Output	Power
API 4051 GI	Factory ranged—specify mV/V and excitation voltage	Factory ranged—specify voltage or milliamps	115 VAC
API 4051 GI A230			230 VAC
API 4051 GI D			9-30 VDC or 10-32 VAC
API 4051 GI P			60-265 VAC or 85-300 VDC

Options–add to end of model number

M01	Built-in calibration resistor. Specify resistor value.
DF	10 millisecond response time, or consult factory
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

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

Electrical Connections and Installation

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. See diagram below for terminal designations and wiring examples. Consult factory for assistance.

This module requires an industry-standard 11-pin socket. Use API 011 or API 011 FS finger-safe socket.

Avoid shock hazards! Turn signal input, output, and power off before connecting or disconnecting wiring. Connect power last.

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

Ranges

The API 4051 GI is factory configured to your exact input and output ranges are pre-configured at the factory as specified on your order. The white model/serial number label will indicate input range, excitation voltage and output range.

Top-mounted, Zero and Span potentiometers are used to fine tune the output signal.

Signal Input Terminals

Refer to wiring diagram at right and strain gauge manufacturer's data sheet for wiring and color-coding. Polarity must be observed when connecting input. Sensor shield wire (if equipped) should be grounded at one end only.

Excitation Voltage

The excitation voltage should match the sensor manufacturer's recommendations.

CAUTION: Never short the excitation leads together. This will cause internal damage to the module.

Although generally not required, an internal adjustment is available to trim the excitation voltage. Consult factory for assistance.

Signal Output Terminals

Polarity must be observed when connecting the signal output.

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

Module Power Terminals

The white label on the side of the module will indicate the power requirements. AC power can be connected with either polarity.

For DC powered modules, polarity MUST be observed. See wiring diagram at right.

Calibration

The output range is pre-configured at the factory as specified on your order. Top-mounted Zero and Span potentiometers are used to calibrate the output to compensate for load and lead variations.

This calibration procedure and does not account for offsets or tare weights. To achieve optimum results, it is recommended that the API 4051 GI be calibrated using an accurate bridge simulator before being placed in service.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Provide an input to the module equal to zero or 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. Example: for 4-20 mA output signal, the Zero control will provide adjustment for the 4 mA or low end of the signal.
4. 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. Example: for 4-20 mA output signal, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. This procedure may have to be repeated several times to achieve the desired accuracy over the selected range.

Calibration Resistor Option M01

The M01 option uses a shunt resistor installed internally in the API 4051 GI. The resistance is specified by the transducer manufacturer. Before starting calibration, ensure that the correct resistance value was specified.

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

1. With the API 4051 GI powered and the transducer at operating temperature, adjust the zero pot located on top of the API 4051 GI for a zero or low-end output (for example, 4 mA for a 4-20 mA output).
2. 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.
3. Set the API 4051 GI TEST toggle switch to the TEST position. The internal shunt resistor is switched into the circuit to unbalance the bridge.
4. Adjust the span pot to the for an 80% full-scale output or 80% reading on the process indicator.
5. Return the TEST switch to the opposite position and readjust the zero pot if necessary.

Output Test Function

Note that models with the M01 option does not have a TEST function. With this option the Test switch operates the calibration resistor 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 normally passive devices that 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 or pressure that is applied to the sensor.

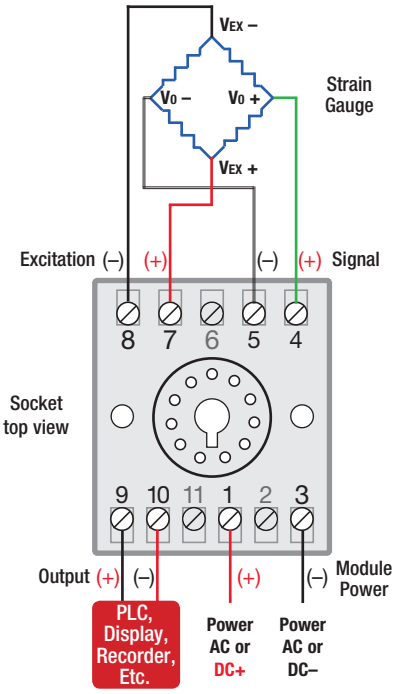
The exact output of the sensor (measured in millivolts) is determined by the sensitivity of the sensor (mV/V) and the excitation voltage applied.

The API 4051 GI 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 ordered, 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.

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



When ordered with a mA output the API 4051 GI provides 20 V power for loop

Diagnostic Voltage Measurements

Using a meter with at least 10 megaohm input impedance, measure the voltage coming from the strain gauge at the locations shown. Sensitivity is measured in mV/V.

Positive Meter Lead	Negative Meter Lead	Meter Reading No pressure/ load	Meter Reading Full pressure/load
+ Exc.	– Exc.	Excitation Voltage	Excitation Voltage
+ Sig.	– Exc.	+ ½ Excitation Voltage	½ Excitation Voltage + (½ Excitation Voltage x Sensitivity)
– Sig.	– Exc.	+ ½ Excitation Voltage	½ Excitation Voltage – (½ Excitation Voltage x Sensitivity)
+ Sig.	– Sig.	Zero Volts	Excitation Voltage x Sensitivity

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