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 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 Range
Factory configured, 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 × excitation voltage = total mV range

Input Impedance
1 MΩ minimum

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
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

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

DC Output Range
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
- Complianc, drive at 20 mA: 20 V, 1000 Ω drive

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

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 mVrms

Output Linearity and Temperature Effects
Better than ±0.1% of span linearity
Better than ±0.02% of span per °C temperature stability
Calculated, not tested

Ambient Operating Temperature Range
-10°C to +60°C ambient operating limits

Response Time
70 milliseconds (14.2 Hz) typical
Contact factory for other response times
Option DF: 10 milliseconds (100 Hz) response time typical

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

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

Variable Brightness
Input LED
Output Test Button
Output Span
Output Zero

Multi-turn zero and span potentiometers
Adjusted 0-100% of span
Sets output to test level when pressed

Output Calibration
- Factory ranged specify mV/V and excitation voltage
- Factory specified voltage or milliamp range

API 4051 GI
- Factory ranged specify mV/V and excitation voltage
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API 4051 GI D
- 85-265 VAC 50/60 Hz, 60-300 VDC 2.5 W typ.
- 9-30 VDC, 2.5 W typical

API 4051 GI P
- 85-265 VAC 50/60 Hz, 60-300 VDC 2.5 W typ.

API 4051 GI A230
- 115 VAC ±10%, 50/60 Hz, 2.5 W max.
- 230 VAC ±10%, 50/60 Hz, 2.5 W max.

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

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.

Output Test
The output test is not available with the M01 or M02 options. 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.

Options—add to end of model number
- M01: Switch with built-in calibration resistor. Specify resistor value.
- M02: Switch for external calibration resistor
- DF: 10 millisecond response time, or consult factory.
- U: Conformal coating for moisture resistance

Accessories—order as a separate line item
- API 011 FS: 11-pin DIN rail or surface mount finger-safe socket, DIN rail or surface mount
- API CLP1: Module hold-down spring for high vibration or mobile applications

API 4051 GI
- Factory ranged specify mV/V and excitation voltage
- Factory specified voltage or milliamp range

API 011 FS: 300 V Rating
- 11-pin DIN rail or surface mount

API CLP1: 300 V Rating

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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.
Précations
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 specific requirements.

WARNING: This product can expose you to chemicals including lead, which is 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

Socket and Mounting
Install module in a protective panel or enclosure. Allow space around module for air flow. Use API 01I or API 012 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.

Electrical Connections
See model/serial number label for module power requirements, input range, excitation voltage, output range, and options.

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 requirements.
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 (pooring). If the output does not function, check all wiring polarity.

Module Power Terminals
The 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.

Calibration
Input and output ranges as specified on your order are factory pre-configured (at 24°C ±1°C). This procedure and does not account for offset or tare weight calibration. To achieve optimum results, it is recommended that the API 4051 GI be calibrated using an accurate bridge simulator.
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 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 6 on the API 4051 G socket. The sensor manufacturer should provide the percentage of full-scale transducer output when using the calibration resistor.
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. 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 signal desired. The Zero control should only be adjusted when the input signal is at its minimum. 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.

Output Test Function
Note that models with the M01 or M02 option do 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 configuration. Sensitivity is measured in mV/V.
The output loop current path is complete. For either current or voltage output, the output display instrumentation, e.g. control system or process indicator, will indicate the signal coming from the strain gauge at the location shown. Sensitivity is measured in mV/V.

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

<table>
<thead>
<tr>
<th>Positive Meter Lead</th>
<th>Negative Meter Lead</th>
<th>Meter Reading</th>
<th>Meter Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Exc.</td>
<td>– Exc.</td>
<td>Excitation Voltage</td>
<td>Excitation Voltage</td>
</tr>
<tr>
<td>+ Sig.</td>
<td>– Exc.</td>
<td>½ Excitation Voltage + (½ Excitation Voltage x Sensitivity)</td>
<td></td>
</tr>
<tr>
<td>– Sig.</td>
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