Strain Gauge/Bridge/Load Cell/Pressure Transducer to DC Transmitters, Field Rangeable

**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-selecetable: 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 mA to ±25 mA
- 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 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**
- 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

**Power**
- Standard: 115 VAC ±10%, 50/60 Hz, 2.5 W max.
- A230 option: 230 VAC ±10%, 50/60 Hz, 2.5 W max.
- D option: 9-30 VDC, 2.5 W typical

**Output Test Button**
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 switch.

**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.

**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**
- **Model**: API 4058 G
- **Input**: Field configurable. Specify the following if factory is to set switches
- **Output**: Field configurable. Specify following if factory is to set switches
- **Power**: 115 VAC

**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
- **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

**Specifications**
- **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 15 mA bridge excitation power supply generates a stable source of excitation voltage to drive from one to four 350 Q (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.
  - Output, input, 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.

**Delivery**
- **Ordering Options**
  - **API 4058 G**: Field configurable. Specify the following if factory is to set switches
  - **API 4058 G D**: Excitation voltage
  - **API 4058 G A230**: Bridge mV/V or mV range

**Accessories**
- **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

**Power**
- **Model**: API 4058 G
- **Input**: Field configurable. Specify the following if factory is to set switches
- **Output**: Field configurable. Specify following if factory is to set switches
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**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
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 Voltage | Range
--- | ---
A | 0-500 mV
B | 0-1000 mV
C | 0-1200 mV
D | 0-1600 mV
E | 0-2000 mV

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 or I for current, depending on the output type.

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 module serial number label must match the power source. AC power can be connected with either polarity. Polarity must be observed for DC powered modules.

Calibration

This procedure 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 ±10 V 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 resistance which is within 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 ±10 V 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.

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 direct 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 mA for load variations of 0 to 100%.

3 mV/V sensitivity X 10 VDC excitation = 30 mA 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, 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 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.