Strain Gauge/Bridge/Load Cell/Pressure Transducer to DC Transmitters, Factory Ranged

APD 4051

Factory Set for Your Specified Range
• Full 3-Way Input/Output/Power Isolation
• DC Voltage or Current Output
• Removable Plugs for Faster Installation
• Input and Output LoopTracker® LEDs
• Adjustable Output Test

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

Strain Gauge Input
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

Common Mode Rejection
100 dB minimum

Excitation Voltage
Range: 4 to 10 VDC factory set, please specify
Adjustment: ±10% via front potentiometer
Maximum output: 10 VDC maximum at 30 mA
Stability: ±0.01% per °C
Designed for one 350 Ω (or greater) sensor

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
Current: 0-1 mA to 0-20 mA
Compliance, drive at 20 mA: 20 V, 1000 Ω drive
Can be wired for sinking or sourcing mA output

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
Potentiometer factory set to approximately 50% of span

Output Ripple and Noise
Less than 10 mVrms ripple and noise

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
70 milliseconds (142 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 Connectors
IP 40, requires installation in panel or enclosure
For use in Pollution Degree 2 Environment
Mount vertically to a 35 mm DIN rail
Four 4-terminal removable connectors, 14 AWG max wire size

Power
Standard: 85-265 VAC, 50/60 Hz or 60-300 VDC
D option: 9-30 VDC (either polarity) or 10-32 VAC
2.5 W typical

Connect mA Output for Sink or Source
Custom I/O Range
Connect One 350 Ω or Greater Load Cell

Dimensions
22.5 mm W x 85 mm H x 122 mm D

Universal Power
1341516

Sink/Source Versatility
For maximum versatility the APD 4051 milliamp output can be selectively wired for sinking or sourcing. This allows connection to any type of mA input receiving device.

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 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.

Options—add to end of model number

Model: APD 4051  APD 4051 D
Input: Factory ranged, specify mV/V and excitation voltage
Output: Factory ranged, specify voltage or milliamp range
Power: 85-265 VAC or 60-300 VDC 9-30 VDC or 10-32 VAC

API BP4  Spare removable 4 terminal plug, black
**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! Évitez 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 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

### Ranges

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

### Input

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 is factory set and should match the sensor manufacturer’s recommendations. A front potentiometer allows approximately ±10% fine adjustment of the excitation voltage. CAUTION: Never short the excitation leads together. This will cause internal damage to the module.

### Output

Polarity must be observed when connecting the signal output. When a current output is ordered, it can be wired to power the output current loop (sourcing APD 4051 output) or used with devices that provide their own power (sinking APD 4051 output).

<table>
<thead>
<tr>
<th>Type of Device for Output</th>
<th>– Term.</th>
<th>+ Term.</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA (current) input device powers the current loop</td>
<td>2 (+)</td>
<td>3 (+)</td>
</tr>
<tr>
<td>mA (current) input device that is passive. APD module provides the loop power.</td>
<td>3 (–)</td>
<td>4 (+/20 V)</td>
</tr>
<tr>
<td>Device accepts a voltage input.</td>
<td>3 (+)</td>
<td>4 (+)</td>
</tr>
</tbody>
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### Module Power

Check model/serial number label for module operating voltage and see manufacturer’s specifications for wiring designations. Do not make any connections to unused terminals.

### Mounting to a DIN Rail

Install module vertically on a 35 mm DIN rail in a protective enclosure away from heat sources. Do not block air flow. Allow “1” (25 mm) above and below housing vents for air circulation.

1. Tilt front of module downward and position against DIN rail.
2. Clip lower mount to bottom edge of DIN rail.
3. Push front of module upward until upper mount snaps into place.

### Removal

1. Push up on the bottom back of the module.
2. Tilt front of module downward to release upper mount from top edge of DIN rail.
3. The module can now be removed from the DIN rail.

### Calibration

The output range is pre-configured at the factory as specified on your order. 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 APD 4051 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. Using an accurate voltmeter on terminals 10 and 12 adjust the excitation voltage fine adjustment potentiometer to the strain gauge manufacturer’s recommended value.
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 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.

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 a 4-20 mA output signal, the Zero control will provide adjustment for the 4 mA or low end of the signal.

For a ±10 V output signal, the Zero control will provide adjustment for the ±10 V or low end of the signal.

5. The input test function is used to test the module. The Test control can be used to test the output of the sensor to the desired level. It is adjustable from 0 to 100% of the output span.

6. This procedure may have to be repeated several times to achieve the desired accuracy over the selected range.

### Output Test Function

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 test the output to the desired level. It is adjustable from 0 to 100% of the output span.

### 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 pre-cise 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 APD 4051 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.