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

APD 4051

**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
- 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 × excitation voltage = total mV range

**Input Impedance**

1 MΩ minimum

**Common Mode Rejection**

1 MΩ 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**

Nominal time at 63.2% of step change

Standard: 70 milliseconds (14.3 Hz)

DF10 option: Fast response time, 10 milliseconds (100 Hz) nominal. DF option will cause output noise levels to be greater than standard specifications. See APD 4059 for custom response times.

**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

**Applications Link**

api-usa.com/apps

**Description**

The APD 4051 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 APD 4051 is factory configured 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 APD 4051 output can be configured most non-standard requirements. Contact the factory for assistance.

**Dimensions**

22.5 mm W x 117 mm H x 122 mm D

Height includes connectors

**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 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.

**Options**—add to end of model number

<table>
<thead>
<tr>
<th>Model</th>
<th>Input</th>
<th>Output</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>APD 4051</td>
<td>Factory ranged, specify</td>
<td>Factory ranged, specify</td>
<td>85-265 VAC or 60-300 VDC</td>
</tr>
<tr>
<td>APD 4051 D</td>
<td>mV/V and excitation voltage</td>
<td>voltage or milliamp range</td>
<td>9-30 VDC or 10-32 VAC</td>
</tr>
</tbody>
</table>

**Options**

- **DF10**: 10 millisecond response time.
- **U**: Conformal coating for moisture resistance

**Connect mA Output for Sink or Source**

Connect mA Output for Sink or Source

**Custom I/O Range**

5 6 7 8

**Output LoopTracker LED**

Adjustable Output Test Function

**Zero and Span for Output**

Connect One 350 Ω or Greater Load Cell

9 10 11 12

**Universal Power**

13 14 15 16

**Accessories**—Order as separate line item

- **API BP4**: Spare removable 4 terminal plug, black

Contact the factory for assistance.
**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 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

**Electrical Connections**

See wiring diagrams. Observe polarity.

* Do not make any connections to unused terminals or use them as wiring junctions for external devices. This may cause permanent damage to the module!

**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).

If the output does not function, check wiring and polarity.

**Module Power**

Check model/serial number label for module operating voltage to make sure it matches available power. When using DC power, either polarity is acceptable, but for consistency with similar API products, positive (+) can be wired to terminal 13 and negative (–) can be wired to terminal 16.

**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.

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### Type of Device for Output

<table>
<thead>
<tr>
<th>Type of Device for Output</th>
<th>− Term.</th>
<th>+ Term.</th>
</tr>
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<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>
</table>

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**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 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 from minimum to maximum, this may indicate a problem with the 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.

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**Module mA output is unpowered**

**Current Sinking Output**

- **mA Device**
- **Module mA output is unpowered**

**Current Sourcing Output**

- **mA Device**
- **Module mA output loop**

**Voltage Output**

- **Voltage Device**

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**Cu 60/75°C**

- **13 AWG**
- **14 AWG**
- **16 AWG**

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**To maintain full isolation avoid combining power supplies in common with input, output, or unit power.**

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