

**Input:** 2 or 3 Wire RTD  
**Output:** 0-1 V to 0-10 V, ±1 V to ±10 V, 0-1 mA to 20 mA, 4-20 mA

Quick Link: [api-usa.com/4001](http://api-usa.com/4001)

- Convert Temperature to DC Output
- Zero and Span for Output
- Full 1200 V Isolation
- Input and Output LoopTracker® LEDs
- Output Test Button
- Built-In Loop Power Supply for Sink/Source Output



Applications Link  
[api-usa.com/apps](http://api-usa.com/apps)

Free Factory I/O Setup!

**Applications**

- Convert Output From RTD Sensor for PLC Input, Control and/or Validation
- Interface an RTD with Panel Meters, PLCs, Recorders, Data Acq., DCS, & SCADA Systems

**Temperature Input Range**

Factory configured, please specify the following Resistance at 0°C, curve, temperature range

RTD types: 10 Ω to 2000 Ω RTDs including  
 100 Ω 0.00385 DIN, 100 Ω 0.003916,  
 100 Ω 0.00392, 10 Ω Cu,  
 1000 Ω Ni-Fe, 120 Ω Ni

Temperature range: °F or °C  
 100°F (55°C) min. span or consult factory

**RTD Typical Excitation Current**

10 Ω: 10 mA  
 100 Ω: 2 mA  
 1000 Ω: 0.5 mA  
 2000 Ω: 0.2 mA

**Leadwire Compensation**

< ±0.05% of span per 1 Ω change in leadwire resistance

**LoopTracker**

Variable brightness LEDs indicate I/O loop level and status

**DC Output Range**

Factory ranged, please specify output type and range

Voltage: 0-1 VDC to 0-10 VDC, 10 mA max up to 20 VDC with M09

Bipolar voltage: ±1 VDC to ±10 VDC

Current: 0-1 mADC to 0-20 mADC, 4-20 mADC  
 20 V compliance, 1000 Ω at 20 mA

**Output Calibration**

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

**Output Loop Power Supply**

20 VDC nominal, regulated, 25 mADC, <10 mVRMS max. ripple  
 May be selectively wired for sinking or sourcing mA output

**Output Test/Override**

Front momentary button or external contact closure sets output to test level. Potentiometer adjustable 0-100% of span.

**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**

70 milliseconds nominal

**Isolation**

Full 3-way isolation: input, output, power, 1200 VRMS minimum  
 600 VAC<sub>p</sub> or 600 VDC common mode protection  
 120 dB minimum common mode rejection

**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**

85-265 VAC, 50/60 Hz or 60-300 VDC, 3 W maximum  
 D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 3 W maximum



**Dimensions**

Height includes connectors  
 0.89" W x 4.62" H x 4.81" D (22.5 x 117 x 122 mm)

**Description**

The APD 4001 accepts an RTD temperature input and provides an optically isolated and linearized DC voltage or current output. The sensor type, temperature range and output range are factory set and can be specified as required. This provides an economical solution when a temperature sensor signal must be converted to a DC signal.

The temperature input is linearized and amplified, and then passed through an optocoupler to the output stage. Full 3-way isolation (input, output, power) make this module useful for ground loop elimination, common mode signal rejection, and noise pickup reduction.

**Output Sink/Source Versatility**

Standard on the APD 4001 is a 20 VDC loop excitation supplies for the output. This power supply can be selectively wired for sinking or sourcing allowing use with any combination of powered or unpowered milliamp devices.

**How to Order**

Models are factory ranged. See I/O ranges above left. Please specify ranges and options on order

**Sensor specifications (resistance and curve)**

**Input temperature range (specify °F or °C)**

**Output range**

See options at right

Model	Description	Power
APD 4001	RTD input to DC output isolated	85-265 VAC, 50/60 Hz or 60-300 VDC
APD 4001 D	transmitter	9-30 VDC or 10-32 VAC

**LoopTracker**

API exclusive features include LoopTracker LEDs (green for input, red for output) that vary in intensity with changes in the process input and output signals.

They provide a quick visual picture of your process loop at all times and can greatly aid in saving time during initial startup and troubleshooting.

**Output Test**

An API exclusive feature includes an output test button to provide a fixed output (independent of the input) when held depressed. The output test greatly aids in saving time during initial startup and/or troubleshooting.

The test output level is potentiometer adjustable from 0 to 100% of the output span. Terminals are provided to operate the test function remotely. This also allows use as a remote manual override to provide a temporary fixed output if desired.

**Options and Accessories**

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

- R** Input output reversal (ie. 20-4 mA out)
- M09** High voltage output >10 V up to 20 V
- U** Conformal coating for moisture resistance

**Accessories—order as separate line item**

**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!** 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](http://api-usa.com) for latest product information. Consult factory for your specific requirements.

**WARNING:** This product can expose you to chemicals including nickel, 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](http://www.P65Warnings.ca.gov)

**Electrical Connections**

Polarity must be observed for output wiring connections. If the output does not function, check wiring and polarity.

Each product is factory configured to your exact input and output ranges as indicated on the serial number label. Input and output ranges are factory calibrated (at 24°C ±1°C).

The power supplies are fuse protected and the unit may be returned to API for fuse replacement.

**Input**

The sensor type and temperature range are factory configured. See the model/serial number label for module information, sensor type, temperature range and options.

The temperature sensor input is connected as shown in the wiring diagram.

RTD Input	Term.	Term.	Term.
Two wire RTD	9 RTD	10 & 11 Jumper	11 RTD
Three wire RTD	9 RTD	10 Exc.	11 RTD

**Output**

For milliamp ranges, determine if your devices provide power to the current loop or if the loop must be powered by the APD module. Typical voltage may be 9-24 VDC at your device's terminals if it provides power to the loop.

Type of Device for Output	- Terminal	+ Terminal
Measuring or recording device accepts a voltage input.	3 (-)	4 (+)
Measuring/recording device accepts a mA (current) input and the input is unpowered or passive. APD module provides the loop power.	3 (-)	4 (+20 V)
Measuring or recording device accepts a mA (current) input and provides power to the current loop.	2 (-)	3 (+)

**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 clip the lower mount with spring clips to the bottom edge of DIN rail.
2. Push front of module upward until upper mount snaps into place.

**Removal**

Avoid shock hazards! Turn signal input, output, and power off before removing module.

1. Push up on bottom back of module.
2. Tilt the 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 input range is factory calibrated and does not require adjustment.

Front-mounted Zero and Span potentiometers adjust the output and can be used to compensate for load and lead variations.

1. Apply power to the module and allow a minimum 30 minute warm up time.
2. Using an accurate calibration source, provide an input to the module equal to 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, 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. For example: 4 mA for a 4-20 mA output or -10 V for a ±10V output.
5. Repeat adjustments for maximum accuracy.

**Output Test Function**

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 is factory set to approximately 50% output. It can be adjusted to set the test output 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.

They may optionally be externally wired for remote test operation or a manual override. See wiring diagram at right.

**Operation**

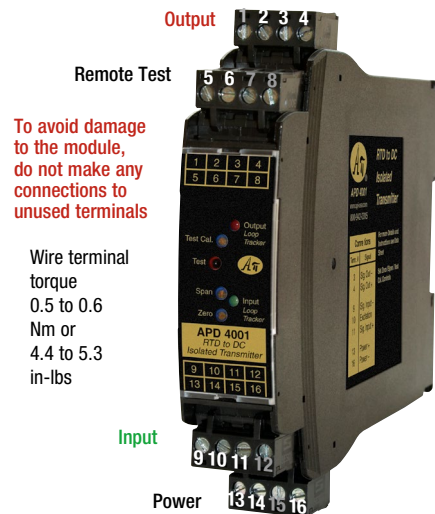
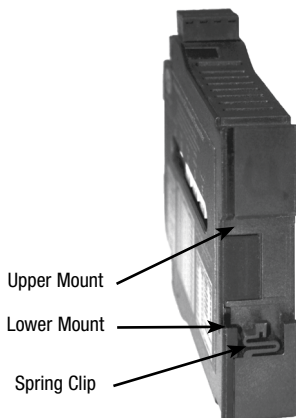
The APD 4001 accepts an RTD input and provides a linearized and optically isolated DC voltage or current output.

The 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 strength 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, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

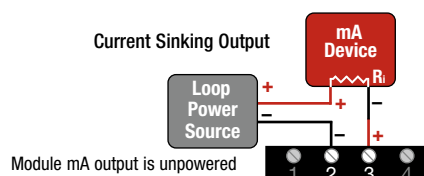
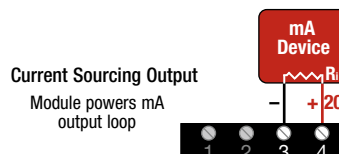
The red LoopTracker output LED provides a visual indication that the output signal is functioning. It becomes brighter as the input and output changes from minimum to maximum.

For a current output, 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.



To avoid damage to the module, do not make any connections to unused terminals

Wire terminal torque  
0.5 to 0.6 Nm or  
4.4 to 5.3 in-lbs



To maintain full isolation and avoid malfunctions, do not connect power supplies in common with input, output or unit power. Do not connect anything to unused terminals.

